



GOVERNMENT OF KARNATAKA

# KARNATAKA: PERSPECTIVE PLAN 2001

## VOLUME-II



REPORT OF THE EXPERT GROUP  
OCTOBER 1989



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# STRUCTURAL ANALYSIS OF KARNATAKA

by

V.R. Panchamukhi and L. N. Rastogi

The pace and pattern of development of an economy depend upon the sectoral structure of production and the intersectoral linkages. Structural changes are very much part of the process of development, while planning in the medium and long run is meant to bring about desired structural changes that would be consistent with various social and economic goals. Analysis of production structure and structural changes of the past periods would provide a good insight into the perspectives of the future. The purpose of this paper is to present an insight into the structure of the Karnataka economy through the method of input-output analysis for the period 1983-84.

The input-output technique has been well recognised as a tool for analysing the nature of intersectoral linkages and the sectoral patterns of value-added as also the final demand. It is extensively used in medium and long term planning models. An Input-Output table can be presented in two forms:

1. Flows of transaction in intermediate use and the final use,
2. Input-output co-efficient giving the sectoral input requirements per unit of output.

The table of transaction flows gives an idea about the pattern of distribution of output of a sector into different intermediate uses by the different sectors and for final use. When such a transaction

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We are extremely grateful to Dr. Gladys Sumitra for her invaluable support, painstaking efforts in mobilising basic data and men and her application of the subject.

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matrix is presented for a regional economy, the sectoral outputs refer to the production activity of the regional economy, while the transaction flows give the total flows derived from both the sectoral production activity and other sources outside the regional economy. The extent of the dependence of the different regional sectors on the production activities within the region itself could be roughly gauged by the difference between the intermediate flows and the regional production levels. Information of the transaction matrix could be used for various purposes such as working out the extent of backward and forward linkages, deriving allocation coefficients of particular sector's output among the different using sectors, working out input content in output of specific sectors such as fuel, basic metals, agricultural inputs, etc.

We present below a profile of some of the alternative uses to which an input-output table, either in the form of a transaction matrix or as a coefficient matrix could be put,

1. As stated earlier, the coefficients of backward and forward linkages could be worked out for the different sectors - which information could be used for ranking the different sectors in terms of their potential output-inducement effects.
2. Input coefficients of the regional economy could be compared with those of the national economy or other regions and thereby inferences about the technological distances with the different regions or the national economy could be derived. Similarly, comparisons of input coefficients of the categories such as census and non census sub-sectors could be useful in examining the effects of scale, product mix



etc. on the structure of inputs.

-1

3. The elements of  $(I-A)$  matrix would give an idea about the direct and the indirect input content per unit of final demand of different sectors. It would be useful to know for example, the direct and the indirect fuel content of a unit of final demand. Similarly, we could also workout the direct and indirect contents in regard to other strategic inputs, such as chemicals, iron and steel, agriculture, etc. for the different sectors of the regional economy.

4. Information available in the Input-Output tables can be fruitfully used to work out the indices of the net incidence of the various fiscal and monetary policies on the production activities. The parameters, such as effective rate of protection or domestic resource cost could be estimated for the different sectors, which information would be useful in evaluating the net incidence of the policy packages either at the State level or at the national level.

5. Assuming that the input coefficients remain constant, one can make projections for the desired output structure and the implied level of state domestic product which would be consistent with a desired pattern of final demand in a future period. Of course, the stipulation of the structure of the final demand could be based upon the desired levels of structure of basic needs that ought to be fulfilled. Further, if information on probable changes in technology is available, then this could be incorporated in the matrix of input coefficients for deriving the output levels under this new technological framework.



6. The studies in the literature on Input-Output analysis have also used this versatile technique for separating the effects of technological changes, shifts in the structure of final demand changes in the patterns of trade on the growth process at the level of each sector or in the aggregate. Such a decomposition of the growth process is extremely useful in not only understanding the development process in the past but also in deriving policy inferences for the future.

7. Input-Output technique provides a systematic framework for studying the emerging trends in supply-demand imbalances at each sector level. Further, it could also be used to work out the implications for flows of funds which would be consistent with the physical flows of commodities.

The above profile of some of the important applications of the Input-Output analysis, brings out that an exercise of this kind for a regional economy would be an extremely important input in the preparation of its perspective plan. It is in this light that this exercise was undertaken for the Karnataka economy.

#### Construction of the Table

The first step in the construction of the Input-Output table is to decide about relevant sectoral classification. In order to provide comparability of the regional table with the national table, it was decided to adopt in principle the sectoral classification of the national table provided by the Planning Commission for the year 1984-85. This sectoral classification is a modification of the similar one



adopted for the I-O table of Karnataka for the year 1978-79. However, since there are some special sectors which are prominent in the regional economy, it was decided to recognise them explicitly in the regional Input-Output table. The following sectors are separately recognised in this regard:

1. Silk Textiles
2. Agarbatti etc.
3. Earth Moving Machinery
4. Machine Tools
5. Watches and Clocks, and
6. Costume Jewellery

The present exercise is by and large pertaining to working out a transaction matrix and the input coefficients matrix for the manufacturing sectors covered in the Annual Survey of Industries (ASI). The ASI encompasses all factors registered under the Factories Act. Accordingly all establishments with 10 or more workers while using power and 20 or more workers while not using power came within the purview of ASI. For purpose of the survey, factories are classified into two sectors, viz., the census and the non-census sectors. While factories employing 50 or more workers and using power and those employing 100 or more workers but not using power constitute the census sector, the remaining factories belong to the non-census sector. Of course, there is also the important unorganised sector which is not covered by the ASI but on which some information is available in the select rounds of NSS. In compiling the I-O table distributions between the census and the non-census sectors have been



maintained both at 3-4 digit classification of the ASI industries and also at the level of the sectors of the I-0 table.

While the ASI covers as many as 35 sectors of the manufacturing activity, the first 10 sectors pertaining to agriculture and allied activities, the next 5 sectors referring to the mining and quarrying activities and the last 7 sectors pertaining to the construction and service activities are left outside the framework of the ASI. In order to develop separate Input-Output vectors for these sectors, we would have to generate data from other sources. Ideally, even in the agriculture sector, one should have taken out crops, such as Jowar, Bajara and Ragi as specific separate sectors, since these are quite predominant in the regional economy. However, since separate information on them was difficult to obtain, these have not been regarded as separate sectors.

#### Data Sources

Construction of the Input-Output table for the manufacturing sectors is normally based upon the ASI source. The published volumes of ASI do not, however, provide detailed information on different categories of inputs and there is considerable time lag between the generation of the data through the survey and their publication in the ASI volumes. Since it was thought that the most recent available information to which we could have ready access should be taken for the construction of the I-0 table, it was decided to work with the ASI schedules for the year 1983-84. Since the copies of the schedules were available at the State level and since in any case at the final



level of the table firm level data were not to be revealed, it was decided to use the information of schedules for an extensive analysis.

Data on the following items have been called out from the schedules and these have been aggregated firstly to the three or four digit level of ASI code numbers and then to the sectors of the input-output table.

1. Quantity and value of materials consumed  
(Block 13 of ASI-1983 questionnaire)
2. Products and by-products including fixed assets for factory's own use, manufactured and sold during the year (same details as provided for in Block 14 of ASI 1983 questionnaire)
3. Expenditure on industrial services, expenditure on non-industrial services, quantity of electricity produced, quantity of electricity sold, value of electricity sold, goods sold in the same condition as purchased.
4. Quantity and value of fuel and lubricants consumed. Classification of fuel and lubricant was the same as in Block 9 of the ASI-1983 questionnaire.
5. Salary and wages, Bonus
6. Depreciation, Employment benefit.

Obviously, this step of aggregation would involve developing correspondence between the items of the inputs and the outputs stated in the ASI schedules and the ASI code numbers as also the sectors of the I-0 table. This exercise has to be done separately for the census and the non-census schedules and the information of the latter has to be blown-up to cover the entire population whenever data collection is done on a sample basis.

Even though the steps stated above seem to be very simple and



straightforward, one faces a number of problems in the actual implementation of the steps due to the data inadequacies of the schedules. We discuss some of the problems of this kind in greater detail.

#### Data Problems

The problems of processing the data of the schedules could be discussed under the following headings: Coding problems, incomplete input data, unspecified "Others", allocation of industrial services, treatment of rent and interest, incomplete output data, blowing up factor for the non-census sectors, treatment of industrial and non-industrial services, adjustment for producers prices. Obviously some of these are strictly conceptual issues, while some others arise on account of the inefficiencies of the investigators and also perhaps callous response by the respondents.

We are giving below a detailed account of some of these problems which we had to tackle in the course of our exercise.

We may mention at the outset that these deficiencies of the data sources are of serious nature and they obviously imply a number of adjustments and corrections based upon the subjective judgments and perceptions. These deficiencies would also obviously introduce significant margins of error in the estimates of industrial production, input cost, state domestic product, etc. done by the different authorities using these data sources. It is a moot question to ask as to whether at the final stage of processing, the authorities have ignored these deficiencies or whether they have



introduced their own corrections and adjustments and if so what are the processes for such adjustments and what is the margin of error in the final estimates. This entire area is confounded with guestimates. It also raises the basic questions relating to the quality and the reliability of the entire infrastructure and the methodology implied in the system of collection and processing of the primary data.

Data problems created quite a few frustrating moments in the whole project of constructing the input-output table. Human error, mechanical error and the inevitable delays involved in tackling them as also complexities of some of the conceptual issues were responsible for creating situations of ignorance and moments of despair. Perseverance coupled with courage and an acute sense of practical judgment alone could steer the analyst out of these operationally insurmountable hurdles. The final product of this exercise is testimony to this path of endurance.

Arising out of these experiences of the basic data problems and recognising the need for streamlining the data base and also the imperatives of conducting studies on the analysis of structure of the regional economy on a regular basis, a number of suggestions in this regard will be given in some of the later pages.

### Coding Problems

It is claimed in recent years that the ASI schedules have been designed in such a way that data contained in them could be stored and processed in the computer. The computerisation obviously, implies



systematic coding of the different items and the different blocks of the schedule. However, one faces a number of problems in this regard.

One could categorise the problems in the following manners:

1. The same code numbers are used for the different inputs of the different ASI industries. Similarly, same code numbers on the output side are used in the different ASI three digit or four digit industries.
2. A number of code numbers are missing even though the description of the items is given in the schedules.
3. Wrong code numbers are given in some cases of input items.
4. Nomenclature of the items given in the schedules is not to be found in the NSSO's publication on the list of materials consumed and the products made.
5. Code numbers on the input side and the output side do not conform to the ASI industry level code numbers.
6. A large volume and value is often shown against the code number of "others" both on the input side and the output side.

Complete listing of the code numbers as per the different industries is given in the NSSO's publications (three volumes) entitled 'List of materials consumed and products made' (classified as per NIC - 70). There are also many difficulties in using this list. We would elucidate them in the following paragraphs at relevant places.

#### Problem of same Code Numbers

It is puzzling to note that the code numbers given on the input side or on the output side of a particular three or four digit ASI industry are not different from those given in another industry even though the items are different. The code numbers on the input side for every ASI three or four digit industry begin from 1001 and go up



to 1099. Similarly, on the output side, they begin from 5001 onwards. The code numbers 1001, 1002 etc., for example, do not mean the same things in different industries. For example, the code number 1006 in the case of ASI industry 356.4 namely, manufacture of power driven pumps, would mean angles, channels, shapes and sections of iron and steel. While in the case of the industry 356.6 namely, ball, roller and tapper bearings, it would mean brass tubes and rods. If one were to aggregate the inputs 1006 over the different producing units belonging to the ASI industry 356.4, the type of coding system adopted in the ASI schedule is alright. However, if one were to know the total intermediate use of angles, channels, shapes, and sections of iron and steel of all the using industries, one cannot obviously add the values and the volumes shown against 1006 in the different industries. Thus, the computerised data system with this coding diagram serves an extremely limited purpose. The construction of an input-output table requires aggregation of many ASI three to four digit industries to get the figure for the particular sector of the input-output table. Further, the input items will have to correspond to the sectoral classification of the input-output table. This peculiar coding system adopted in the ASI schedules almost tends to make a computerised approach to the construction of input-output table an extremely hazardous proposition. In fact, it was also realised in this exercise late in the day that the manual processing of the entire data would have been much more simple and manageable than the computerised approach.

The similar problem arises on the output side. The code number 5001, 5002 etc. do not mean the same thing in the different ASI



industries. Firstly, they do not conform to the ASI three to four digit code numbers and hence one cannot again aggregate the values and the volumes of the code numbers 5001 to 5002 to get a picture of the total output in the economy from the different industries. This system is again alright if one were to do the limited job of aggregating the data over the different producing units belonging to the same ASI three or four digit classification.

In view of the above stated difficulty, one has to adopt the roundabout method of firstly building correspondence between the input code numbers and the output code numbers given in the different schedules on the one hand and the ASI three or four digit code numbers on the other and then develop the correspondence between these ASI three or four digit code numbers and the numbers of the sectoral classification. Fortunately, some work done on the first part - though not very exhaustive and not recent - was available in the CSO and access to this was useful in manually aggregating the input data of the different ASI industries belonging to the given sectoral classification.

#### Missing Code Numbers

The scrutiny of the ASI schedules reveals many appalling features arising partly due to the investigators' callous work. In many places, nomenclature of the inputs/outputs are given though not always in full form, while the corresponding code numbers are not mentioned. Such a state of affairs exists on the schedules even after these have been duly scrutinised by the senior supervisors. Obviously, such schedules when taken by the computer operators for feeding in the data



would induce them to skip over the items in which the code numbers are not specified. One cannot help fearing that such a situation is a reality in the case of a number of schedules. The effort to put codes against such items would face two types of problems. Firstly, the nomenclature given may not be clearly spelt out, and secondly, even if it is clearly spelt out the description of the items is not available in the standard manual prepared by the NSSO. In both the cases, extra effort is required in making use of the information fully rather than adopting the easy approach of ignoring it. We have put in our best efforts to make use of the available information to the maximum possible extent without ignoring any item as such.

#### Wrong Code Numbers

The cases of nomenclature being given but the code numbers being wrong are also observed in the schedules. This situation is much more dangerous than the earlier situation because there is a tendency of overlooking the correctness of the correspondence between the code numbers and the nomenclatures. However, when the data are being analysed manually and frequent reference is made to the publications, the list of materials consumed and the products produced, one tends to discover such wrong codes. It has been possible to correct the wrong codes wherever they were discovered. One cannot however give a quantitative magnitude of the error that might have crept in when such scrutiny has not been perfect.

#### Codes not conforming to the ASI Format

As stated earlier, the code numbers on the input side or the



output side will have to first correspond to the ASI code numbers at the three or four digit level. It is only when such correspondence of a product or by-product or input items are worked out that the correspondence with sectoral classification can be derived. The code numbers given in the filled-in ASI questionnaire are also often not found in the Common Product Nomenclature and this is a serious problem. One reason for this could be that the said publications may have adopted standard nomenclature while the investigators have given the information based upon some local nomenclature. This makes the use of the publication difficult to a great extent. One way to increase its utility is to give popular local nomenclature along with the standard nomenclature. Further, it may also be necessary to update the publications from time to time so that new input uses and technologies, etc. get reflected in the manual.

The volume of Common Product Nomenclature does not carry the index of the items covered in it. Hence, the respondents might find it difficult to locate the code numbers of a particular input or output readily. It will be useful to provide such indexing in the volume.

#### **The Category of "Others" and "Unspecified"**

A perusal of the ASI schedules reveals that in some cases the category of "others" or "unspecified" items is quite substantial. This situation could be partly due to the fact that the respondents tend to curtail the details and add a number of items under the category of "others" or due to the fact that certain items are not found in the common product nomenclature and as such they are clubbed into the



category of "others". In the first stage of the processing of data it was found that the category of 'others' in a large number of industries was very significant and substantial. In view of this a second round of processing and adjustment was done by going back to the schedules. The structure that was shown in the reasonably more complete schedule was applied to the schedules in which the category of "others" was predominant and this helped in reducing the volume of the "others" at the level of industry also.

### Treatment of Industrial Services

Block 10 of the ASI schedule provides information of industrial services rendered by others to the unit in the following details:

- i) Repair and maintenance of buildings
- ii) Repair and maintenance of machinery
- iii) Repair and maintenance of other fixed assets
- iv) Cost of contract of commissioned work done by others on materials supplied by the factory, and
- v) The total expenditure on industrial services.

Since the values shown against these items constitute the costs of production they must be included in the flow matrix of the input-output table. However, it is possible that some part of this expenditure also implies capital expenditures. But we have no information on this. But in view of this very broad categorisation of the services and in the absence of information on the specific materials used in these services it becomes difficult to allocate them over the different sectors as also between the flows and capital



stocks. However, one has to adopt some rough and ready approach to allocate these items over the different sectors of the input-output table. These have been allocated to the sectors of construction, non-electrical machinery, other services etc. It may be observed that it is useful for the schedule to collect the information in greater details on these different items.

#### Information on Margins and Deriving Producers Values

One of the important things that needs to be done for the input output table is to derive the values of output and inputs in producers' prices. The ASI schedules given in Block 14 give information on quantity manufactured, quantity sold, value sold, and different categories of margins. The approach to be adopted for deriving the value in producers prices is to first get the adjustment of the unit value of sales for the different output items by dividing the value by quantity sold and then subtracting the margins on each item. We should then multiply the quantity manufactured by this unit value which gives the products value of the quantity manufactured in the current year. So far it seems quite good and simple. However, considering the magnitude of the missing data, this task becomes quite hazardous. In many cases, either the quantity sold is not available or quantity manufactured is not available. Further, the margins are not specified against the different items of the output. They are sometimes shown separately under different heads and are not presented in the column of the totals. If such schedules are used for computerised approach then there is the danger, that the totals may not be used for making adjustments. In view of the difficulties involved



in adjusting the output data from market prices to producers prices. It was decided that the Input-output table should be constructed in the market prices themselves. Further, if the tables have to be in producers prices, adjustment will have to be made both on the input side and on the output side. In order to make the adjustment on the input side, the margins will have to be taken out from each of the input items and allocated into the different service sectors. Alternatively, a broad ratio of market price to producers price will have to be worked out on the basis of the information on the output side, and then this applied to the input items for separating the components of the margins. It was feared that use of wrong ratios or inadequate identification of the margins could lead to distorted information on the producers' prices. In view of this, it was decided that the whole table be constructed only in market prices.

#### Treatment of Rent and Interest

Block 12 of the ASI schedules provides information on the receipts for non-industrial services rendered by the unit to the others and the expenditure on this account are given in Block 11. Rent and interest are shown in these blocks. It appears that rents are included in gross output of the unit - hence they get included in the value added. But there is some fear that this rent would appear twice, once as an expenditure item having been excluded from total input and secondly as a receipt item having been included in the gross output. Double counting could be avoided by excluding rent from the unit's gross output. This would however need information on rent receipts. Since data is available on a net basis it is not possible



to separate receipt and expenditure. Similarly, on the interest side, one gets the problem of double-counting, both as an input and as an output. This is a very important conceptual problem in using the data of the ASI schedules for calculating value added.

#### Blowing-up Factors for Non-Census Sector of the ASI

The input-output structure of a regional economy has to cover the census sector, non-census sector and the unorganised sector. The non-census sector, as the name indicates, should ideally cover the information on a sample basis. It has been customary in the past, that the sample is 50% of the total population of the sample sector and as such, the blow-up factor should be to multiply the value by two to get the information of the population. However, it is indicated in the publications of the ASI, that in some ASI code numbers the non-census sector is also covered on a full enumeration basis. Hence, the choice of the appropriate blowing-up factor has to be carefully done by using this additional information. The fact that the blow up factor is based only on the number of units without taking note of their weightage in terms of employment, is an issue which deserves special consideration.

#### Unorganised Sector

Data on the unorganised sector is extremely scanty. However, additional information has been obtained on the gross value added, and the input structures of the following broad categories of activities in the unorganized sector:



1. Food products
2. Beverages, Tobacco, etc.
3. Textiles
4. Wood furniture, etc.
5. Paper and Printing, etc.
6. Leather and Fur products
7. Rubber, Petroleum, etc.
8. Chemicals
9. Non-metallic mineral products
10. Basic metal Industries
11. Metal Products
12. Machinery, Machine tools
13. Electrical Machinery
14. Transport Equipment
15. Other Manufacturing

### **Treatment of Agriculture and Other Activities**

The information for the agricultural sector of the regional economy has been derived from various sources. The inputs of seeds was culled from the records of the State Government, while information on uses of fertilizers and energy was based on the report, "Energy Demand for Agriculture in India in the Year 2000" (Indian Institute of Management, Ahmedabad).

### **Input-Output Table - 1983-84**

After processing the basic data of the ASI schedules and also after performing the necessary adjustments and corrections, the Transaction Matrix for the census sector and the non-census sector were separately prepared. The corresponding output vectors were also prepared. Initially, the tables are of sector into industry type in which the rows of the table represent the sectors of the input-output table, while the columns refer to three or four digit ASI industries. Using the correspondence between the sectors of the input-output table and the ASI Code Numbers, the columns were regrouped in the form of



the sectors of the input-output table. The input-output coefficients were then worked out by dividing the transaction flows by the corresponding using sectors' output, in order to analyse the difference between the input coefficients of the census and the non-census sectors, corresponding input coefficients were worked out in the first instance separately for these two categories of the sectors.

In order to derive the total Transaction Matrix, the flows in the non-census sector were blown up by the appropriate blowing factors, wherever necessary. Combining the two types of transaction flows we get the Matrix of total Transaction flows. Input-output coefficients were then worked out for the total regional economy by dividing the total transaction flows by the appropriate using sectors' output levels. This final table is still rectangular, since the rows refer to all the sectors of the economy, while the columns begin from sector (Sugar) and end with sector (Electricity). Input coefficients for some of the agricultural sectors 1 to 7, were worked out on the basis of separate information. However, for the rest of the sectors, from 8 to 15 and 52 to 55, the coefficients have been derived from the input-output Matrix at the national level.

Before obtaining the final square matrix  $A$  and then  $(I-A)$ , some more adjustments were made. The classification of the sectors was readjusted to conform to the categories presented in the State level GDP tables. The details of the manufacturing sectors were retained as presented in the ASI sources. Mining was aggregated into one sector and some further aggregation was done among the service sectors. Thus, we have finally 51 sectors as against 56 sectors of the national



input-output table. After constructing the square Matrix of input-output coefficients ( $\Lambda$ ), the Inverse Matrix,  $I-\Lambda$ , has been worked out. (Table Nos. 1 to 4).

Special attention should be given to the fuel sectors of the input-output table. By and large, there are five categories of the fuel sector, namely forestry (providing wood), coal and lignite coal, crude petroleum and natural gas, petroleum products, coal and coal tar products and electricity. Of course, all of these may not be relevant in each using sector. The input coefficient corresponding to these items will be used for further analysis of the fuel intensity of production in the different sectors.

As stated earlier, the sectoral classification is primarily based upon the input-output table of the national economy and as such, some comparison of the input coefficients of the regional economy with those of the national economy would also be attempted.

#### Comparison of the Census and the Non-Census Sectors

It should be noted at the outset, that the units in the census and the non-census sectors differ not only in terms of the scale of operation, but more importantly in terms of the product mix, input structure, technology, etc. They differ from each other significantly in regard to managerial capabilities and marketing strategies. Thus, when we observe the differences in their input coefficients and in the rate of value-added, we cannot attribute all of these to the factor of scale economies. Further, the two sectors are not perfectly



substitutable in view of these differences in their structural characteristics. In other words, we can not argue categorically that the census sector could be replaced by the non-census sector or vice versa - either fully or partly - simply because the value-added rate is larger in one in relation to the other. In fact, in most cases, the units in the non-census sector are highly complementary to those in the census sector.

Notwithstanding these general observations, there is scope for planning the proper mix of the census and the non-census sectors in order that the objectives of total employment and income and energy conservation could be realised in an effective way. While we do not claim to do any such exercise of working out the optimum mix of the two types of sectors, we feel that the information available herein would be useful for such planning exercises.

Table No.5 presents the indices of similarity or dissimilarity of the structure of input co-efficients of the census and the non-census sectors for select sectors, where such comparison is feasible. Of course, such comparisons are possible only from sector 13 onwards, since the census and non-census category of the units are recorded for them.

Of the 30 sectors for which such comparison is made, one observes that the similarity coefficient is quite high - above 0.80 for as many as 16 sectors such as Khandasari and Bura, Silk textiles, other textiles, leather and leather products, agarbati and perfumes, iron



and steel etc. It is interesting to note that for most of the machinery sector, the similarity coefficient is quite high-almost near one. The sectors for which the input coefficients of the two categories are greatly dissimilar, are other food and beverages, cotton textiles, art silk, synthetic fiber textiles, rubber products, fertilisers and pesticides, and non-ferrous metals.

Table No.6 gives value-added rates in the two categories of the units. The value-added per unit of output is highest in the sector of Agarbati and Perfumes (0.93) in the case of the census sector, while it is the highest for the communication and electronic equipments in the non-census category (0.82). Out of the 30 sectors for which the comparison could be made, one finds that in the case of 233 sectors the value-added rates in the non-census category are lower than those in the census sector, and the difference between the value added rates is quite substantial in the majority of the cases (15 cases). The value added rates in the non-census sector or larger than those in the census sector in the case of Art Silk and Synthetic Fiber Textiles, Hand Tools, other Metal Products, Earth-Moving Machinery and Watches and Clocks (very marginally in the last case). The rank correlation coefficient between the two types of the value-added rates works out to 0.2522. This indicates that the two categories of units differ significantly in regard to their value-added contents.

#### Fuel Coefficients

Fuel is one of the strategic inputs in production activities. Its importance has become much more explicit since the oil price hike



in 1973. The world over, new efforts have been initiated to identify alternative technologies, production processes and product mixes in such a way that the fuel requirement per unit of output is made as small as possible. Apart from the increasing cost of the petroleum products, it is now recognised that fuel is an exhaustible resource and it needs to be sparingly used. Intensive R and D efforts for identifying alternative sources of fuel such as solar energy, natural wastes, gobar gas, nuclear energy, etc. both for domestic and for industrial uses have been launched. These initiatives, both in the developed and the developing countries have led to effective substitution of one form of energy by the other and also for conservation of energy by unit of output. In many planning models at the national level or at the sectoral level, minimisation of energy use is propounded as the objective function of the planning process. In short, the assessment of energy content of output deserves special attention.

In the input-output table of the Karnataka economy, we have four different sectors which could be regarded as suppliers of one or the other source of energy. These sectors are forestry (9), petroleum products (24), coal tar products (25) and electricity (47). These are identified as fuel sectors based on the Fuel Block of the ASI schedules. The original A matrix indicates the direct use of these different categories of fuel per unit of output in the different sectors. Similar elements in the  $(I - A)^{-1}$  matrix present the direct and indirect fuel content per unit of the final demand of the different sectors. Even though the denominators of these two types of fuel input coefficients are different, they could be still used to



derive some idea about the effect of intersectoral linkages on fuel demand. The tables No.7 and 8 give these two types of fuel coefficients for the different sectors of the regional economy. We will confine our attention to the manufacturing sectors from 13 to 51.

Table No.7 presents the fuel coefficients of the census and the non-census sectors of the manufacturing activity. In the case of census sector, the fuel content per unit of output is more than 10 per cent in the manufacturing activities of paper and paper products, fertilizer and pesticides, non-metallic products, iron and steel, non-ferrous metals and electricity generation. In the case of non-census sector, however, the fuel content per unit of output is not more than 10 per cent in any of the manufacturing activities. Non-census categories of the units have by and large much less fuel content than the census categories. The difference between the two fuel coefficients is also quite large. These results suggest that if one has to conserve fuel in the production activities then the units in the non-census sector having much less fuel coefficient should be increased in number.

The ratio of fuel input to non-fuel inputs could be interpreted to mean the fuel intensity of the production activity. The last two columns of the table No.7 give these fuel intensity indices (in percentage) for the census and the non-census categories. There is a significant contrast between the census and the non-census sectors in this regard. Units in the census sector are obviously several times more fuel intensive than those in the non-census categories. Large



fuel intensity may be a reflection of the nature of the technology of production as also the extent of efficiency/inefficiency in the use of fuel including waste and irrational use.

It would be interesting to examine as to how the fuel content of output is responsive to the changes in the level of value added across the industries. The hypothesis in this regard could be that the higher the value added per unit of output in the different industries the higher is the fuel content. The elasticity of the fuel content with respect to the value added in a unit of output could give a quantitative index to the relationship between these two variables. The analysis of this relationship for the census and non-census sectors would also provide interesting results. This exercise has been done separately for two categories of fuels, namely petroleum products and electricity. One finds that in the case of the census sector, that the relationship between the content of petroleum products per unit of output and value added rate is negative. As we move from one sector to the other an increase in the value added rate by 100% would imply a fall in the petroleum input coefficient of about 43%. A similar fall in the electricity coefficient is about 95%. The elasticity of substitution of petroleum products by electricity with respect to the change in the value added rates is found to be 0.5210 in the case of the census sector. Since the elasticity coefficient is positive, it means that electricity and petroleum are complementary inputs in the case of the census sector. Thus, as electricity is increased by 100%, the use of petroleum products as a fuel is increased by 52%.



In the case of the non-census categories of units, one finds strikingly different results. With the 100% increase in the value-added rates across the industries, the petroleum input coefficient falls about 46% and the elasticity input coefficient by 33%. Elasticities of substitution of electricity by petroleum with respect to value-added rates, is found to be negative, though a small value. As the relative change in the value added is one unit, then the ratio of petroleum input coefficient to electricity input coefficient falls by about 0.13 units. Thus in the case of the non-census sector, petroleum products and electricity are indeed mutually substitutable.

The above analysis should have been ideally done by using cross-section data of the different firms within each other. This would throw more light on the shifts in the fuel coefficients, as the scale and the value added rates change within each industry. More meaningful insights could also be obtained in regard to the inter-fuel substitution (as between petroleum products and the electricity) within each industrial category. The basic data for such an exercise is available and this will be done in due course of time.

Based upon some of the results described in the previous paragraphs, one could draw a general inference that the management of the fuel economy is possible, if we manipulate the scales, product composition and location of units in a desired direction. Information on fuel content and fuel intensity would be useful in identifying the types of sectors which could be taken up on a priority basis for the management of the fuel economy.



## Backward and forward linkages

As stated earlier, the information on input coefficients could be used to estimate the backward and forward linkages of the different sectors. Four types of coefficients are worked out in this regard. Backward and forward linkage coefficients based upon the direct input flows, total direct and indirect output inducement effect of one unit of final demand of one sector with all other sectors of the economy and the total output inducement received in a sector due to the inter-sectoral linkages with all the other sectors.

Considering the total linkage effect, one observes that one unit of the final demand of the Machine tool sector has the maximum output inducement effect on the other sectors followed by the sector of iron and steel, other transport equipment, leather and leather products, fertilisers and pesticides, etc. If we consider the total output inducement received in a sector, one finds that the sector of iron and steel comes on the top of the list followed by other chemicals, petroleum products, other services, electricity, other crops, etc. The rank correlation coefficient between the two types of linkage effects is very small, being at the level of 0.1362 - (Table Nos. 9 and 10)

## Perspective for 2000 A.D.

Input-output models are also used for making projections of the output structures which are consistent with a given structure of final demand. A desired pattern of final demand could be stipulated on the

basis of certain desired objectives of planning. For a regional economy, the final demand for any sector consists of the following items:

- Demand for final consumption within the regional economy +
- Demand for capital formation within the regional economy +
- Demand for exports to the rest of the economy from the region +
- Demand for exports to the rest of the world outside the country - imports from the rest of the economy to the region - imports from the rest of the world directly in to the regional economy.

In a simple projection model one should ideally project these different items on the basis of certain behavioural and technological relationships. However, in the present exercise we do not have detailed information on these components of the final demand. Data on inter-regional trade flows and information on public and private sector demands are extremely scanty. It is also difficult to build up the vector of capital formation and exports and imports in relation to the rest of the world. In the background of these extremely inadequate data on the components of the final demand, it was decided to work at the aggregate level of the final demand.

As stated earlier, the sectoral classification of the transaction matrix has been adjusted to conform to the classification which is used in the State level GDP tables. This helps us to get information on the value-added of the service sectors and some of the primary product sectors. The value added in the manufacturing sector is already derived from the detailed analysis of the ASI data for the regional economy. Thus, all these different segments of data sources together give us the value added levels of the different sectors of the input of the table. By using the ratio of value added to gross



output as derived from the regional table (as usual using national coefficients in a few sectors) the gross output factor is derived for the regional economy. The Transaction Matrix for the regional economy is then derived by using the A Matrix and the gross output sectors of the regional economy. Now the difference between the output of a sector and the total intermediate use of the product of that sector (by aggregating for each row of the Transaction Matrix), we get the vector of aggregate net final demand ( $C+I+E-M$ ), for the different sectors.

In order to derive the sectoral structure of output in 2000 A.D. we consider the following alternative scenarios:

Scenario No. 1: Doubling the demand for the goods of the basic needs sector, by 2000 A.D. and stipulating the other sectors growth at the rate as the state level GDP. This scenario could be called as the Scenario of Basic Needs Expansion.

Scenario No. 2: Stipulating 10 per cent growth rate for the sectors with high backward linkages effects such as the Machine tools, fertilizer and pesticides, non-electrical machinery etc. and assuming the same growth rate as the State level GDP for the other sectors. This Scenario may be called as the Growth-Center Scenario.

Scenario No. 3: A combination of the stipulations of both the above scenarios. This may be called as Basic Needs Expansion and Growth Centre Scenario.

In each of the above scenarios, the levels of the final demand for the year 2000 A.D. are first worked out and then using the I-A matrix the output levels for the different sectors consistent with these stipulated final demand levels could be derived. The output

structure of 2000 A.D. compared with the output structure of 1983-84 would give us the implicit growth rate of the different sectors. The direct and indirect fuel content of these stipulated final demand levels could also be worked out to examine the fuel implications of the alternative perspectives of production and service activities in the regional economy.



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Table : 1  
INPUT USE COEFFICIENT MATRIX CENSUS SECTOR

	12	13	14	15	16	17	18	19	20	21
1 PADDY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.011013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.032403	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000019	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.011048	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.034618	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.597836	0.503477	0.042480	0.000002	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.020500	0.000000	0.199703	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.003059	0.011883	0.000059	0.000000	0.001174	0.000000	0.000653	0.000615	0.006987	0.000075
10 FISHING	0.000000	0.000000	0.002914	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.005028	0.000634	0.000653	0.012939	0.019475	0.000000	0.000000	0.000000	0.000000	0.000000
12 SUGAR	0.010629	0.000000	0.004026	0.000000	0.000000	0.000000	0.000000	0.001376	0.123711	0.000000
13 KHANDASARI & BOORA	0.002421	0.059325	0.000029	0.000000	0.000000	0.000000	0.000000	0.000000	0.000222	0.000000
14 OTH. FOOD & BEV.	0.000124	0.003302	0.000930	0.001931	0.000096	0.000207	0.007987	0.004556	0.007203	0.022630
15 COTTON TEXTILES	0.000000	0.000448	0.003232	0.046497	0.000179	0.599083	0.085478	0.002201	0.000450	0.016078
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000027	0.287376	0.000000	0.000000	0.000000	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.013669	0.006013	0.051221	0.000903	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.020009	0.021021	0.001331	0.005576	0.061687	0.002771	0.244048	0.000202	0.003746	0.005451
19 WOOD BASED IND.	0.000242	0.000000	0.000240	0.000302	0.005324	0.015752	0.000019	0.263386	0.000187	0.000000
20 PAPER & PAPER BASED IND.	0.001357	0.001015	0.013357	0.002776	0.002292	0.000143	0.006987	0.001467	0.180141	0.001992
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000103	0.000000	0.000000	0.000029	0.000078	0.000068	0.450311
22 RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000002	0.000000	0.000000	0.000000	0.000000	0.000023	0.000000
23 PLASTIC PROD.	0.000350	0.000464	0.001116	0.000965	0.000370	0.002554	0.000567	0.001074	0.000299	0.001474
24 PETROLEUM PROD.	0.006226	0.010538	0.005809	0.014570	0.008413	0.003058	0.010256	0.013523	0.034481	0.009730
25 COAL TAR PROD.	0.000000	0.000000	0.000000	0.001328	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26 FERT & PESTICIDES	0.010723	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27 AGAR BATTI ETC.,	0.000000	0.000000	0.000067	0.000016	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28 SYNTHETIC FIN. & RESEINS	0.000000	0.000000	0.000069	0.010808	0.000000	0.069013	0.054793	0.049469	0.004935	0.001800
29 OTHER CHEM.	0.003649	0.007685	0.004203	0.340411	0.013979	0.002950	0.038844	0.015471	0.057181	0.054259
30 CEMENT	0.003657	0.001606	0.002990	0.000030	0.000000	0.000000	0.000000	0.000000	0.000004	0.000827
31 OTH. NON-METAL PROD.	0.002379	0.000065	0.007416	0.000431	0.000000	0.000000	0.000000	0.000150	0.000000	0.000000
32 IRON & STEEL	0.000000	0.000000	0.000247	0.016437	0.000000	0.000000	0.000000	0.002339	0.000008	0.000000
33 NON-FERROUS METALS	0.000000	0.000000	0.002662	0.000000	0.000003	0.000000	0.000000	0.000072	0.000335	0.000000
34 HAND TOOLS	0.000000	0.000000	0.000001	0.000003	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
35 OTH. METAL PROD.	0.000000	0.000000	0.003310	0.000005	0.000000	0.000000	0.000029	0.002726	0.000041	0.000000
36 EARLY MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005013	0.001321	0.000075	0.000376
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACHI.	0.008386	0.010867	0.003981	0.017074	0.009746	0.000711	0.051328	0.014758	0.016472	0.009639
39 ELEC. MACHINES	0.000000	0.000000	0.000000	0.000059	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000033	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
43 COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
44 WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
45 COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46 OTHER MFG.	0.000038	0.000060	0.000029	0.000691	0.000109	0.000010	0.000117	0.000090	0.000093	0.000120
47 ELECTRICITY	0.006683	0.031653	0.001783	0.026961	0.005900	0.025661	0.011845	0.010318	0.041344	0.002210
48 CONSTN.	0.008386	0.010867	0.003981	0.015965	0.009746	0.000711	0.050954	0.014758	0.016472	0.009639
49 TRANS. SERVICES	0.000200	0.010422	0.002055	0.001242	0.001398	0.001016	0.014436	0.006735	0.002029	0.013886
50 COMMUNICATION	0.000103	0.003575	0.000562	0.001302	0.002681	0.000450	0.000930	0.000059	0.002781	0.007218
51 OTHER SERVICES	0.000846	0.015026	0.004204	0.008666	0.012798	0.002812	0.029645	0.024156	0.010093	0.020419
TOTAL INPUT	0.726120	0.725355	0.262217	0.555700	0.657296	0.794647	0.630872	0.490180	0.619124	0.734742
TOTAL OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
VALUE ADDED	0.273872	0.274645	0.737783	0.444292	0.342704	0.205353	0.369128	0.501820	0.380876	0.265258



INPUT USE COEFFICIENT MATRIX CENSUS SECTOR

	22	23	24	25	26	27	28	29	30
1 PADDY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.020696	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0039
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
9 FORESTRY	0.000131	0.000000	0.004341	0.003593	0.000764	0.000000	0.001378	0.000000	0.0600
10 FISHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
11 MINING	0.014972	0.000000	0.001973	0.000508	0.003552	0.000000	0.005613	0.285326	0.0899
12 SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
13 KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
14 OTH. FOOD & BEV.	0.002421	0.002930	0.011444	0.038562	0.000489	0.000965	0.011052	0.000606	0.0031
15 COTTON TEXTILES	0.000349	0.000000	0.000000	0.000000	0.000000	0.000000	0.024805	0.000000	0.0000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
17 ART SILK & SYN. FIB. TEX.	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
18 OTHER TEXTILES	0.000030	0.000319	0.000000	0.010272	0.000071	0.006282	0.000178	0.107720	0.0019
19 WOOD BASED IND.	0.000014	0.000022	0.000000	0.000000	0.000010	0.000000	0.000005	0.000000	0.0001
20 PAPER & PAPER BASED IND.	0.000914	0.000899	0.003157	0.003593	0.003024	0.000636	0.007896	0.002575	0.0050
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
22 RUBBER PRODUCTS	0.007396	0.000000	0.000000	0.000000	0.000000	0.000000	0.000034	0.000000	0.0000
23 PLASTIC PROD.	0.000229	0.014368	0.000789	0.002565	0.000114	0.000127	0.001209	0.000514	0.0003
24 PETROLEUM PROD.	0.009467	0.016260	0.046172	0.002685	0.005867	0.001653	0.008520	0.016616	0.1692
25 COAL TAR PROD.	0.000246	0.000000	0.057695	0.000000	0.000000	0.000000	0.000155	0.000000	0.0152
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.074308	0.000000	0.000000	0.000031	0.000000	0.0000
27 AGAR BATTI ETC.,	0.000000	0.000000	0.000000	0.000000	0.000709	0.000000	0.000079	0.000000	0.0000
28 SYNTHETIC FIN. & RESEINS	0.006071	0.054300	0.000000	0.000000	0.001903	0.219715	0.000007	0.000000	0.0000
29 OTHER CHEM.	0.011580	0.001610	0.000395	0.000000	0.038905	0.130272	0.019916	0.004102	0.0250
30 CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000035	0.006482	0.0092
31 OTH. NON-METAL PROD.	0.001169	0.000000	0.000000	0.000000	0.000233	0.000000	0.002077	0.003590	0.0411
32 IRON & STEEL	0.000000	0.000152	0.000000	0.000000	0.000000	0.001817	0.000004	0.004162	0.0521
33 NON-FERROUS METALS	0.000000	0.000928	0.000000	0.101172	0.000489	0.000000	0.002169	0.000000	0.0000
34 HAND TOOLS	0.000227	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
35 OTH. METAL PROD.	0.000007	0.000022	0.000000	0.001184	0.000000	0.000000	0.010115	0.013102	0.0012
36 ENGR'G. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
38 NON-ELEC. MACHI.	0.006434	0.013805	0.016930	0.072200	0.000688	0.009922	0.000000	0.000270	0.0169
39 ELEC. MACHINES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
42 OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
43 COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
44 WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
45 COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
46 OTHER. MFG.	0.000059	0.000051	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
47 ELECTRICITY	0.006764	0.069270	0.006314	0.048796	0.001260	0.073315	0.012191	0.079074	0.0459
48 CONSTN.	0.006434	0.013805	0.016930	0.072200	0.000688	0.009922	0.000361	0.005348	0.0165
49 TRANS. SERVICES	0.002171	0.000602	0.013023	0.015402	0.001948	0.000306	0.006291	0.010575	0.0309
50 COMMUNICATION	0.007462	0.010545	0.071429	0.171540	0.000603	0.001176	0.026011	0.002962	0.0030
51 OTHER SERVICES	0.009684	0.011706	0.045777	0.153561	0.000350	0.000000	0.030324	0.032270	0.0160
TOTAL INPUT	0.115315	0.220748	0.299921	0.051251	0.071107	0.465467	0.213423	0.606778	0.6267
TOTAL OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.0000
VALUE ADDED	0.084685	0.779252	0.700079	0.148749	0.928893	0.534533	0.786577	0.393222	0.3732



# USE COEFFICIENT MATRIX CENSUS SECTOR

	32	33	34	35	36	37	38	39	40	41
1. Paddy	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2. WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3. OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4. PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5. FINE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6. TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7. OTHER CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8. ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9. FORESTRY	0.005224	0.000000	0.000000	0.001604	0.000000	0.001909	0.001106	0.000011	0.019528	0.001116
10. FISHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11. MINING	0.027837	0.000000	0.000000	0.001258	0.000000	0.002003	0.000208	0.000001	0.006325	0.000000
12. SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13. KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14. OTH. FOOD & BEV.	0.002478	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15. COTTON TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16. SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17. ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18. OTHER TEXTILES	0.001769	0.000000	0.000000	0.000106	0.000000	0.001655	0.000026	0.000027	0.000000	0.000000
19. WOOD BASED IND.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
20. PAPER & PAPER BASED IND.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21. LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22. RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23. PLASTIC PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24. PETROLEUM PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25. COAL TAR PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26. FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27. AGAR BATTI ETC.,	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28. SYNTHETIC FIN. & RESEINS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29. OTHER CHEM.	0.010617	0.000000	0.000000	0.003048	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30. CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31. OTH. NON-METAL PROD.	0.020519	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
32. IRON & STEEL	0.346408	0.000000	0.000000	0.194641	0.046846	0.297716	0.210912	0.116696	0.104205	0.104205
33. NON-FERROUS METALS	0.036186	0.000000	0.000000	0.182488	0.000122	0.026705	0.020884	0.115962	0.053626	0.053626
34. HAND TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
35. OTH. METAL PROD.	0.100741	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
36. EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37. MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38. NON-ELEC. MACHI.	0.022158	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
39. ELEC. MACHINES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
40. PAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41. MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42. OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
43. COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
44. WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
45. COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46. OTHER. MFG.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
47. ELECTRICITY	0.002995	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
48. CONSTN.	0.022024	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
49. TRANS. SERVICES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
50. COMMUNICATION	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
51. OTHER SERVICES	0.012040	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL INPUT	0.797389	0.200189	0.479534	0.650256	0.374646	0.759842	0.505999	0.491072	0.302292	0.201474
TOTAL OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
VALUE ADDED	0.202411	0.799811	0.520466	0.349742	0.625354	0.240158	0.494001	0.508928	0.697708	0.798526



# INPUT USE COEFFICIENT MATRIX CENSUS SECTOR

	42	43	44	45	46	47
1 PADDY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.000000	0.000000	0.001756	0.000000	0.000000	0.000000
10 FISHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12 SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13 KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14 OTH. FOOD & BEV.	0.012023	0.002339	0.001795	0.019476	0.004787	0.000000
15 COTTON TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19 WOOD BASED IND.	0.005503	0.007828	0.000000	0.001989	0.000000	0.000000
20 PAPER & PAPER BASED IND.	0.010293	0.001827	0.001551	0.011520	0.007283	0.000000
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22 RUBBER PRODUCTS	0.013957	0.000000	0.000000	0.000000	0.000000	0.000000
23 PLASTIC PROD.	0.000000	0.000167	0.010075	0.001169	0.001456	0.000000
24 PETROLEUM PROD.	0.000000	0.002968	0.000000	0.003978	0.042122	0.000000
25 COAL TAR PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27 AGAR BATTI ETC.,	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28 SYNTHETIC FIN. & RESEINS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29 OTHER CHEM.	0.000314	0.007185	0.073455	0.012432	0.004029	0.000000
30 CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31 OTH. NON-METAL PROD.	0.000000	0.000530	0.008406	0.000000	0.000000	0.000000
32 IRON & STEEL	0.125611	0.006839	0.046724	0.044008	0.000000	0.000000
33 NON-FERROUS METALS	0.078856	0.077384	0.003041	0.023706	0.000000	0.000000
34 HAND TOOLS	0.000000	0.000477	0.000000	0.000000	0.000000	0.000000
35 OTH. METAL PROD.	0.000000	0.001683	0.000100	0.000000	0.000526	0.000000
36 EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACHI.	0.027289	0.005562	0.035106	0.024040	0.002160	0.000000
39 ELEC. MACHINES	0.000000	0.025354	0.000000	0.006382	0.000053	0.000000
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0.028116	0.000000	0.000000	0.000000	0.000000	0.000000
43 COMM. & ELE. EQUIP.	0.000000	0.015266	0.000000	0.000000	0.000000	0.000000
44 WATCHES & CLOCKS	0.000000	0.000000	0.212956	0.000000	0.000000	0.000000
45 COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46 OTHER. MFG.	0.000314	0.000053	0.003025	0.028996	0.000485	0.000000
47 ELECTRICITY	0.000000	0.001163	0.005747	0.004475	0.157304	0.000000
48 CONSTN.	0.027289	0.005132	0.035106	0.027853	0.002010	0.000000
49 TRANS. SERVICES	0.011061	0.001397	0.000049	0.017073	0.000733	0.000000
50 COMMUNICATION	0.000025	0.001128	0.002117	0.012600	0.006730	0.000000
51 OTHER SERVICES	0.046249	0.007450	0.009135	0.051964	0.032492	0.000000
TOTAL INPUT	0.397174	0.167396	0.493084	0.293701	0.427805	0.000000
TOTAL OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
VALUE ADDED	0.602826	0.832604	0.506916	0.706299	0.572195	0.000000



2  
USE COEFFICIENT MATRIX NON-CENSUS SECTOR

	12	13	14	15	16	17	18	19	20	21
PADDY	0.000000	0.066463	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
WHEAT	0.000000	0.160565	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER CEREALS	0.000000	0.012620	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
PULSES	0.000000	0.245565	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
FIBRE CROPS	0.000000	0.000000	0.029735	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TEA & COFFEE PLANTS	0.000000	0.023645	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER CROPS	0.513342	0.080163	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ANIMAL HUSBANDRY	0.000000	0.012396	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
FORESTRY	0.000000	0.000725	0.004372	0.003466	0.000000	0.000000	0.000000	0.000000	0.000000	0.316166
FISHING	0.000000	0.023156	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MINING	0.006353	0.002244	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SUGAR	0.000000	0.004535	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
KHANDASARI & BOORA	0.000640	0.000216	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTH. FOOD & BEV.	0.003653	0.004897	0.002797	0.001125	0.005943	0.005748	0.004836	0.006793	0.004181	0.004181
COTTON TEXTILES	0.000000	0.000164	0.378356	0.000129	0.000052	0.268070	0.000757	0.001519	0.031700	0.000000
SILK TEXTILES	0.000000	0.000000	0.001337	0.431156	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.023892	0.001190	0.237919	0.110064	0.000000	0.000000	0.000000	0.000000
OTHER TEXTILES	0.000000	0.006388	0.014068	0.000347	0.000256	0.392098	0.000370	0.002633	0.003689	0.000000
WOOD BASED IND.	0.000000	0.001318	0.000000	0.000789	0.000000	0.000662	0.266452	0.000881	0.000000	0.000000
PAPER & PAPER BASED IND.	0.000000	0.003424	0.002810	0.000614	0.001190	0.012021	0.002623	0.076828	0.000871	0.000000
LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001589	0.610118	0.000000
RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002271	0.000255	0.003964
PLASTIC PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002271	0.000255	0.003964
PETROLEUM PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
COAL TAR PROD.	0.033672	0.005411	0.016228	0.002302	0.000595	0.010104	0.020506	0.010000	0.001559	0.000000
FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
PERFUME ETC.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SYNTHETIC FIB. & RESINS	0.000000	0.000284	0.000026	0.000291	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER CHEM.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
CEMENT	0.000000	0.005747	0.019271	0.009634	0.023819	0.005190	0.011518	0.039748	0.014356	0.000000
OTH. NON-METAL PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
IRON & STEEL	0.000000	0.002209	0.000000	0.000543	0.000000	0.000000	0.000000	0.001021	0.004685	0.000000
NON-FERROUS METALS	0.000000	0.000086	0.017616	0.000000	0.000000	0.000000	0.000000	0.000792	0.000417	0.000000
HAND TOOLS	0.000000	0.000015	0.000000	0.000000	0.000000	0.000000	0.000000	0.000018	0.013487	0.000000
OTH. METAL PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
EARTH MOV. MACH.	0.000000	0.002407	0.001234	0.001132	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NON-ELEC. MACHI.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002042	0.000000	0.000000
ELEC. MACHINES	0.008386	0.009988	0.037354	0.018111	0.012231	0.028816	0.020481	0.022020	0.026205	0.000000
RAIL EQUIP.	0.000000	0.000038	0.000129	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER. MEC.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ELECTRICITY	0.027954	0.010591	0.049377	0.007306	0.015209	0.009688	0.020048	0.012467	0.004844	0.000000
CONSTN.	0.008386	0.009874	0.036991	0.018111	0.012231	0.028816	0.020481	0.022020	0.026205	0.000000
TRANS. SERVICES	0.044028	0.011271	0.007988	0.001274	0.002761	0.005484	0.040334	0.021182	0.019520	0.000000
COMMUNICATIONS	0.002541	0.003363	0.004783	0.001125	0.000020	0.011129	0.007393	0.010913	0.006461	0.000000
OTHER SERVICES	0.029193	0.010844	0.014807	0.003795	0.024720	0.035010	0.026583	0.024843	0.016370	0.000000
TOTAL INPUT	0.731893	0.766343	0.670150	0.901527	0.253214	0.782519	0.651204	0.756081	0.812500	0.000000
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000129	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.268107	0.233646	0.329850	0.098473	0.746786	0.217481	0.348716	0.243919	0.187500	0.000000



INPUT USE COEFFICIENT MATRIX NON-CENSUS SECTOR

	22	23	24	25	26	28	29	30	31
1 PADU	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.078769	0.000000	0.000000	0.000000	0.000000	0.000000	0.034235	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.002315	0.000000	0.000000	0.000000	0.000000	0.000000	0.000341	0.000000	0.054335
10 FISHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.005842	0.000000	0.000000	0.016906	0.000456	0.000000	0.002293	0.000000	0.114420
12 SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000068	0.000000	0.000000
13 KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003087	0.000000	0.000000
14 OTH. FOOD & BEV.	0.003904	0.005056	0.000000	0.009453	0.014220	0.007423	0.027745	0.000000	0.038602
15 COTTON TEXTILES	0.003600	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.001396	0.003105	0.000000	0.003113	0.000000	0.000000	0.002757	0.000000	0.000014
19 WOOD BASED IND.	0.000000	0.000514	0.000000	0.003940	0.015403	0.000000	0.001239	0.000000	0.000444
20 PAPER & PAPER BASED IND.	0.002549	0.005695	0.000000	0.014667	0.009302	0.005104	0.058309	0.000000	0.004667
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000043
22 RUBBER PRODUCTS	0.304931	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23 PLASTIC PROD.	0.001583	0.148861	0.000000	0.006585	0.000967	0.001433	0.000362	0.000000	0.000920
24 PETROLEUM PROD.	0.010305	0.004985	0.460829	0.000503	0.004553	0.000206	0.002541	0.000000	0.018570
25 COAL TAR PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.020690	0.000000	0.000000
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.629763	0.000000	0.000000	0.000000	0.000000	0.000000
27 PERFUME ETC.	0.000000	0.000000	0.000000	0.000000	0.020991	0.000000	0.001208	0.000000	0.000000
28 SYNTHETIC FIB. & RESINS	0.080201	0.572224	0.000000	0.000000	0.018845	0.627384	0.000341	0.000000	0.000000
29 OTHER CHEM.	0.053162	0.019693	0.300683	0.196309	0.445209	0.030240	0.572303	0.000000	0.005015
30 CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.053201
31 OTH. NON-METAL PROD.	0.000992	0.000035	0.000000	0.052227	0.000047	0.000000	0.133317	0.000000	0.074001
32 IRON & STEEL	0.001267	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000382
33 NON-FERROUS METALS	0.001579	0.005706	0.000000	0.000000	0.022142	0.000000	0.004095	0.000000	0.000000
34 HAND TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
35 OTH. METAL PROD.	0.000000	0.024376	0.000000	0.013328	0.004074	0.007114	0.000124	0.000000	0.000000
36 EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACHI.	0.024599	0.022401	0.019244	0.009584	0.020373	0.002518	0.005357	0.000000	0.021756
39 ELEC. MACHINES	0.000000	0.001224	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
43 COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
44 WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
45 COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46 OTHER. MFG.	0.000166	0.000213	0.000000	0.000013	0.000325	0.000340	0.000121	0.000000	0.000307
47 ELECTRICITY	0.019600	0.000693	0.003189	0.000676	0.001725	0.011960	0.008520	0.000000	0.012087
48 CONSTN.	0.024599	0.018746	0.019244	0.009584	0.020373	0.002518	0.005357	0.000000	0.021756
49 TRANS. SERVICES	0.012216	0.013607	0.000456	0.037489	0.011374	0.021012	0.016672	0.000000	0.004410
50 COMMUNICATIONS	0.007917	0.009083	0.001367	0.013196	0.006405	0.012682	0.006909	0.000000	0.011040
51 OTHER SERVICES	0.021189	0.027250	0.005923	0.041004	0.039085	0.046211	0.090775	0.000000	0.119067
TOTAL INPUT	0.604872	0.827690	0.591344	0.748549	0.812348	0.784300	0.727387	0.617942	0.617942
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.395128	0.172302	0.408056	0.251451	0.187652	0.215692	0.272613	0.382058	0.382058



INPUT USE COEFFICIENT MATRIX NON-CENSUS SECTOR

	32	33	34	35	36	37	38	39	40	41
1 PADDY	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10 FISHING	0.019820	0.000077	0.000021	0.001085	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12 SUGAR	0.012736	0.030750	0.000000	0.000013	1.000000	0.000016	0.000011	0.000289	0.006326	0.000093
13 KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14 OTH. FOOD & BEV.	0.003330	0.000238	0.000400	0.001062	0.000431	0.001021	0.001430	0.000288	0.000000	0.000338
15 COTTON TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.000102	0.000000	0.000100	0.000177	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19 WOOD BASED IND.	0.000013	0.000017	0.000190	0.000452	0.000790	0.000629	0.000599	0.000462	0.000000	0.010005
20 PAPER & PAPER BASED IND.	0.004065	0.000168	0.001579	0.014116	0.000188	0.000711	0.000914	0.002213	0.000000	0.003605
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22 RUBBER PRODUCTS	0.000000	0.000000	0.000017	0.000116	0.000197	0.000007	0.000260	0.001375	0.000000	0.000000
23 PLASTIC PROD.	0.000844	0.007737	0.000065	0.001111	0.000037	0.000140	0.000720	0.000085	0.000000	0.058308
24 PETROLEUM PROD.	0.037057	0.001593	0.001228	0.007591	0.000000	0.010229	0.014891	0.022198	0.039809	0.000400
25 COAL TAR PROD.	0.000000	0.000000	0.000000	0.000100	0.000000	0.000000	0.000000	0.000066	0.015207	0.000000
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27 PERFUME ETC.	0.000000	0.000000	0.000000	0.000100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28 SYNTHETIC FIB. & RESINS	0.000000	0.000000	0.000000	0.000117	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29 OTHER CHEM.	0.002171	0.008324	0.009547	0.011508	0.002122	0.034496	0.005029	0.027524	0.022127	0.017762
30 CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31 OTH. NON-METAL PROD.	0.000067	0.000690	0.000057	0.000157	0.000000	0.032049	0.000457	0.000264	0.000000	0.000000
32 IRON & STEEL	0.644279	0.000133	0.166432	0.220409	0.050678	0.393519	0.245704	0.170004	0.104205	0.242141
33 NON-FERROUS METALS	0.005464	0.144091	0.097177	0.170562	0.002368	0.018904	0.024320	0.145624	0.000000	0.104216
34 HAND TOOLS	0.000000	0.000000	0.000000	0.000176	0.000174	0.031175	0.004281	0.006984	0.053626	0.010120
35 OTH. METAL PROD.	0.037567	0.000000	0.000000	0.063517	0.000000	0.030620	0.001407	0.000000	0.000000	0.025751
36 EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.204605	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACH.	0.010096	0.000087	0.020078	0.015570	0.055297	0.023443	0.183349	0.022106	0.002900	0.069642
39 ELEC. MACHINES	0.000000	0.000000	0.000379	0.015975	0.006876	0.084784	0.027766	0.500541	0.000000	0.006121
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.150863	0.000000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000369	0.265417
12 OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000673	0.000000	0.000000	0.000000
13 COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000376	0.000000	0.000000	0.000000
4 WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000029	0.000000	0.000000
5 COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 OTHER. MFG.	0.000271	0.000009	0.000016	0.000085	0.000012	0.000378	0.000155	0.001017	0.000000	0.000000
7 ELECTRICITY	0.018870	0.038424	0.001956	0.014570	0.004383	0.005974	0.011909	0.006266	0.016995	0.002479
8 CONSN.	0.010887	0.000887	0.026667	0.015191	0.007503	0.040177	0.022734	0.008026	0.001619	0.030636
9 TRANS. SERVICES	0.025463	0.000366	0.001621	0.001772	0.000921	0.001687	0.001719	0.000935	0.000000	0.000576
10 COMMUNICATIONS	0.004208	0.000444	0.000691	0.001415	0.000276	0.001723	0.001366	0.000296	0.000000	0.000893
11 OTHER SERVICES	0.020844	0.001092	0.002037	0.005306	0.000839	0.004770	0.005713	0.004715	0.000000	0.002049
TOTAL INPUT	0.952511	0.224485	0.371403	0.563775	0.240567	0.840605	0.506452	0.701455	0.363969	0.800163
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.047489	0.775515	0.620597	0.436225	0.751433	0.151395	0.493548	0.298545	0.636031	0.191837



# INPUT USE COEFFICIENT MATRIX NON-CENSUS SECTOR

	42	43	44	45	46
1 PADDY	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.004203	0.000000	0.001700	0.515099	0.003237
10 FISHING	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.000000	0.000000	0.000000	0.000000	0.000000
12 SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000
13 KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000
14 OTH. FOOD & BEV.	0.007107	0.000187	0.000145	0.006197	0.011726
15 COTTON TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.000000	0.000000	0.000000	0.000720	0.000000
19 WOOD BASED IND.	0.007000	0.001761	0.000000	0.021993	0.003577
20 PAPER & PAPER BASED IND.	0.002611	0.000949	0.000179	0.003404	0.079833
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000
22 RUBBER PRODUCTS	0.005009	0.000000	0.000000	0.000000	0.000000
23 PLASTIC PROD.	0.000510	0.000057	0.000769	0.027352	0.002225
24 PETROLEUM PROD.	0.020553	0.000045	0.007595	0.017106	0.007354
25 COAL TAR PROD.	0.000000	0.000003	0.000000	0.000000	0.000000
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000
27 PERFUME ETC.	0.000000	0.000000	0.000000	0.000000	0.000000
28 SYNTHETIC FIB. & RESINS	0.017706	0.000763	0.001503	0.000000	0.000000
29 OTHER CHEM.	0.019545	0.000405	0.015274	0.000106	0.019234
30 CEMENT	0.000000	0.000000	0.000000	0.000000	0.000000
31 OTH. NON-METAL PROD.	0.035938	0.000608	0.013282	0.000000	0.017766
32 IRON & STEEL	0.231266	0.049492	0.045631	0.000000	0.100562
33 NON-FERROUS METALS	0.030163	0.006656	0.026501	0.000000	0.094906
34 HAND TOOLS	0.000343	0.000551	0.000000	0.005411	0.001919
35 OTH. METAL PROD.	0.003337	0.000000	0.000416	0.000000	0.011151
36 EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACH.	0.027047	0.003278	0.034302	0.030529	0.039836
39 ELEC. MACHINES	0.001082	0.032012	0.000450	0.000000	0.074342
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0.443915	0.000000	0.000000	0.000000	0.000200
43 COMM. & ELE. EQUIP.	0.000000	0.003544	0.000000	0.000000	0.003158
44 WATCHES & CLOCKS	0.000000	0.000000	0.035342	0.000000	0.000000
45 COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.031454	0.000000
46 OTHER. MFG.	0.000170	0.000002	0.251578	0.011154	0.075545
47 ELECTRICITY	0.012639	0.000047	0.005740	0.017979	0.009153
48 CONSTN.	0.024698	0.003278	0.034302	0.030529	0.023689
49 TRANS. SERVICES	0.016266	0.000159	0.000227	0.002514	0.000607
50 COMMUNICATIONS	0.009610	0.000082	0.000202	0.030546	0.014040
51 OTHER SERVICES	0.042941	0.000722	0.000527	0.026200	0.042318
TOTAL INPUT	0.782176	0.184635	0.484693	0.797870	0.621275
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.217024	0.015365	0.515307	0.202130	0.378725

Table : 3  
"A" MATRIX KARNATAKA STATE 1983-84

	1	2	3	4	5	6	7	8	9
1 PADDY	0.032320	0.000213		0.000769					
2 WHEAT	0.000056	0.092290		0.000071		0.000566	0.016995		
3 OTHER CEREALS		0.000251	0.010830	0.000002		0.000379	0.004623		
4 PULSES	0.004160	0.003257		0.062400		0.000017	0.034732		
5 FIBRE CROPS	0.000146	0.000001		0.000052	0.010130	0.000098	0.039471		
6 TEA & COFFEE PLANTS									
7 OTHER CROPS	0.001489	0.005735		0.004755		0.020650	0.340804		
8 ANIMAL HUSBANDRY	0.070352	0.060372	0.126018	0.059009	0.054775	0.062024	0.071432		
9 FORESTRY	0.000054	0.000010					0.000007		
10 FISHING									
11 MINING	0.000015	0.000019	0.000001		0.005097			0.000028	
12 SUGAR									
13 KHANDASARI & BOORA		0.000001							
14 OTH. FOOD & BEV.	0.000008	0.000002		0.000230		0.000016	0.069278		0.000000
15 COTTON TEXTILES	0.000003	0.000003					0.015169		
16 SILK TEXTILES									
17 ART SILK & SYN. FIB. TEX.									
18 OTHER TEXTILES	0.000972	0.000831	0.000001	0.000289	0.000001	0.000009		0.000681	0.016300
19 WOOD BASED IND.	0.000284	0.000476	0.000064	0.000087	0.000067	0.000045		0.004771	0.000000
20 PAPER & PAPER BASED IND.	0.000041	0.000061	0.000006	0.000015	0.000006	0.000005		0.005400	
21 LEATHER & LEATHER PROD.		0.000004							
22 RUBBER PRODUCTS									
23 PLASTIC PROD.									
24 PETROLEUM PROD.	0.026749	0.028428	0.028514	0.017574	0.016652	0.010669		0.003016	0.013900
25 COAL TAR PROD.		0.000005		0.000003					
26 FERT. & PESTICIDES	0.049684	0.082243	0.029387	0.014550	0.040238	0.007943	0.034747		
27 AGAR BATTI ETC.									
28 SYNTHETIC FIB. & RESINS									
29 OTHER CHEM.	0.000008	0.000030		0.000158		0.000001	0.004075		0.000000
30 CEMENT									
31 OTH. NON-METAL PROD.		0.000008				0.000001			
32 IRON & STEEL	0.000001	0.000004							0.000000
33 NON-FERROUS METALS									0.000000
34 HAND TOOLS									
35 OTH. METAL PROD.									
36 EARTH. MOV. MACH.									
37 MACHINE TOOLS									
38 NON-ELEC. MACHI.	0.001827	0.006020	0.006660	0.002765	0.001270	0.000933	0.000734	0.001141	
39 ELEC. MACHINES	0.000074	0.000088	0.000026	0.000010	0.000026		0.000013	0.003461	
40 RAIL EQUIP.									
41 MOTOR VEHICLES	0.000097	0.000153	0.000031	0.000024	0.000033	0.000015		0.000699	
42 OTH. TRANS. EQUIPMENT	0.000002	0.000002						0.000405	0.031000
43 COMM. & ELE. EQUIP.									
44 WATCHES & CLOCKS									
45 COSTUME & JEWELLERY									
46 OTHER. MFG.	0.000031	0.000040	0.000002	0.000009	0.000003	0.000002		0.002018	0.000000
47 ELECTRICITY	0.009360	0.053796	0.008411	0.000070	0.011233	0.000204	0.003943	0.001776	
48 CONSTN.	0.020410	0.021446	0.040402	0.015984	0.010844	0.004392	0.005810	0.009992	0.022630
49 TRANS. SERVICES	0.005861	0.006972	0.003532	0.002389	0.007836	0.007454	0.001945	0.009614	0.016030
50 COMMUNICATION	0.000364	0.000408	0.000126	0.000091	0.000131		0.000061		0.003895
51 OTHER SERVICES	0.021550	0.022157	0.015459	0.011725	0.039757	0.109705	0.011029	0.045668	0.019117
TOTAL INPUT	0.285996	0.414825	0.276311	0.223134	0.235325	0.253693	0.106749	0.501200	0.100011
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.714004	0.604954	0.723689	0.776866	0.764675	0.746307	0.893250	0.418800	0.899989



"A" MATRIX KARNATAKA STATE 1983-84

	11	12	13	14	15	16	17	18	19	20
1 PADDY	0	0.000000	0.000000	0.013185	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0	0.000000	0.000000	0.040602	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0	0.000000	0.000000	0.028478	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0	0.000000	0.000000	0.048731	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0	0.000000	0.000000	0.000000	0.015951	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0	0.000000	0.000000	0.032441	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0	0.597836	0.503759	0.049956	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0	0.000000	0.000000	0.018957	0.000000	1.293010	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0	0.003059	0.011543	0.000191	0.001864	1.002313	0.000000	0.000662	0.191560	0.074559
10 FISHING	0	0.000000	0.000000	0.006930	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.009103	0.005828	0.008569	0.000968	0.009538	1.011075	0.000325	0.000499	0.000521	0.094909
12 SUGAR	0	0.010629	0.000000	0.004127	0.000000	0.000000	0.000000	0.000000	0.000000	0.000173
13 KHANDASARI & BOORA	0	0.002421	0.057878	0.000066	0.000000	0.000000	0.000000	0.000000	0.000000	0.004652
14 OTH. FOOD & BEV.	0	0.000124	0.003312	0.050257	0.002114	0.000607	0.001980	0.007609	0.004730	0.030603
15 COTTON TEXTILES	0	0.000000	0.000435	0.002623	0.133715	0.000154	0.422169	0.116314	0.001304	0.000700
16 SILK TEXTILES	0	0.000000	0.000000	0.000000	0.000311	0.358780	0.000000	0.001560	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0	0.000000	0.000000	0.000000	0.016316	0.003617	0.073383	0.019338	0.000000	0.000000
18 OTHER TEXTILES	0.000487	0.020009	0.020421	0.002334	0.000115	0.035186	0.002018	0.235142	0.000306	0.003486
19 WOOD BASED IND.	0	0.000242	0.000000	0.000453	0.000113	0.003071	0.011037	0.005068	0.175946	0.000349
20 PAPER & PAPER BASED IND.	0.000171	0.001357	0.000986	0.011387	0.002115	0.001458	0.000459	0.007837	0.015298	0.237857
21 LEATHER & LEATHER PROD.	0	0.000000	0.000000	0.000000	0.000276	0.000000	0.000000	0.000024	0.000029	0.005726
22 RUBBER PRODUCTS	0	0.000000	0.000000	0.000000	0.000115	0.000000	0.000000	0.000000	0.001411	0.000078
23 PLASTIC PROD.	0	0.000350	0.000451	0.001071	0.000354	0.000305	0.001861	0.002039	0.004556	0.001450
24 PETROLEUM PROD.	0.028625	0.006226	0.011199	0.005734	0.015006	0.005377	0.004715	0.010244	0.017862	0.028761
25 COAL TAR PROD.	0	0.000000	0.000000	0.000000	0.000979	0.000000	0.000000	0.000000	0.000000	0.000000
26 FERT & PESTICIDES	0	0.010723	0.000000	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27 AGAR BATTI ETC.,	0	0.000000	0.000000	0.000110	0.000019	0.000145	0.000000	0.000000	0.000000	0.001406
28 SYNTHETIC FIB. & RESINS	0	0.000000	0.000000	0.000056	0.000011	0.000000	0.048355	0.045539	0.025154	0.003784
29 OTHER CHEM.	0.007825	0.036449	0.007165	0.004510	0.256001	0.011820	0.009202	0.033161	0.013014	0.053107
30 CEMENT	0	0.003657	0.001560	0.001595	0.000022	0.000000	0.000000	0.000000	0.000000	0.000003
31 OTH. NON-METAL PROD.	0.000409	0.002379	0.000063	0.006303	0.000318	0.000270	0.000000	0.000000	0.000691	0.001095
32 IRON & STEEL	0	0.000000	0.000000	0.000215	0.016747	0.000000	0.000000	0.000000	0.001378	0.000165
33 NON-FERROUS METALS	0	0.000000	0.000000	0.002137	0.000000	0.003061	0.000000	0.000000	0.000038	0.003409
34 HAND TOOLS	0	0.000000	0.000000	0.000002	0.000000	0.000000	0.000000	0.000319	0.004040	0.000145
35 OTH. METAL PROD.	0	0.000000	0.000000	0.003131	0.000755	0.000562	0.000000	0.005323	0.000500	0.000080
36 EARTH MOV. MACH.	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACHI.	0.027444	0.008386	0.010797	0.005173	0.022404	0.013901	0.009765	0.047527	0.018314	0.017769
39 ELEC. MACHINES	0	0.000000	0.000000	0.000000	0.000077	0.000000	0.000000	0.000000	0.000000	0.000000
40 RAIL EQUIP.	0	0.000000	0.000000	0.000000	0.000025	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
43 COMM. & ELE. EQUIP.	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
44 WATCHES & CLOCKS	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000830	0.000000	0.000000
45 COSTUME & JEWELLERY	0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46 OTHER. MFG.	0.003287	0.000038	0.000066	0.000033	0.000539	0.000055	0.000031	0.000144	0.000141	0.000113
47 ELECTRICITY	0.028620	0.006683	0.031547	0.003530	0.032853	0.007101	0.022533	0.011481	0.016365	0.034595
48 CONSTN.	0.010046	0.000386	0.010797	0.005150	0.021492	0.013901	0.009765	0.047143	0.018314	0.017769
49 TRANS. SERVICES	0.001714	0.000208	0.011381	0.003884	0.002994	0.001336	0.001538	0.012924	0.043943	0.007118
50 COMMUNICATION	0	0.000103	0.003546	0.001118	0.002217	0.001908	0.002716	0.009302	0.006131	0.004682
51 OTHER SERVICES	0.016793	0.000046	0.015430	0.005521	0.010200	0.000325	0.000370	0.030551	0.025664	0.010671
TOTAL INPUT	0.150398	0.726128	0.725542	0.362227	0.585788	0.778576	0.632579	0.656482	0.593321	0.651136
GROSS OUTPUT	1	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.849601	0.273072	0.274458	0.637771	0.414212	0.221360	0.367421	0.343518	0.406679	0.348864



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	21	22	23	24	25	26	27	28	29	30
1 PADDY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.031018	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.297911	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10 FISHING	0.000000	0.000520	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12 SUGAR	0.000000	0.013349	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13 KHANDASARI & HOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14 OTH. FOOD & BEV.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15 COTTON TEXTILES	0.005611	0.002685	0.003886	0.000000	0.011444	0.024317	0.000000	0.001281	0.017935	0.000000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.014577	0.000000
17 ART SILK & SYN. FIB. TEX.	0.002156	0.000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.003825	0.000279	0.001572	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19 WOOD BASED IND.	0.000000	0.000012	0.000243	0.000000	0.000000	0.005769	0.000004	0.005975	0.001241	0.107728
20 PAPER & PAPER BASED IND.	0.000000	0.001265	0.003057	0.000000	0.000000	0.001932	0.001658	0.000000	0.000000	0.000000
21 LEATHER & LEATHER PROD.	0.303059	0.000000	0.000000	0.000000	0.003157	0.000012	0.012983	0.000000	0.000000	0.000000
22 RUBBER PRODUCTS	0.020562	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23 PLASTIC PROD.	0.001378	0.004974	0.037042	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24 PETROLEUM PROD.	0.004960	0.000616	0.019077	0.220501	0.046172	0.042468	0.005726	0.001502	0.017808	0.016616
25 COAL TAR PROD.	0.000000	0.000203	0.000000	0.019027	0.057695	0.000000	0.000000	0.000000	0.000000	0.000000
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000	0.109662	0.000000	0.000000	0.000000	0.000000
27 AGAR BATTI ETC.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28 SYNTHETIC FIB. & RESINS	0.003739	0.014247	0.207276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
29 OTHER CHEM.	0.017447	0.018953	0.009744	0.300683	0.000395	0.096068	0.002473	0.125510	0.120556	0.004102
30 CEMENT	0.000698	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
31 OTH. NON-METAL PROD.	0.000000	0.001138	0.000016	0.000000	0.000000	0.025558	0.001262	0.000000	0.000000	0.000000
32 IRON & STEEL	0.000000	0.000225	0.000004	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
33 NON-FERROUS METALS	0.000000	0.014500	0.003527	0.000000	0.000000	0.051661	0.002007	0.000000	0.003293	0.000000
34 HARD TOOLS	0.000000	0.000187	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
35 OTH. METAL PROD.	0.001995	0.000006	0.010977	0.000000	0.001184	0.006523	0.000517	0.000348	0.005995	0.013102
36 EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACHI.	0.024921	0.009663	0.017672	0.019244	0.016930	0.041557	0.002795	0.009560	0.006962	0.009278
39 ELEC. MACHINES	0.000000	0.000000	0.000551	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
43 COMM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
44 WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
45 COSTUME & JEWELLERY	0.004219	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
46 OTHER. MFG.	0.000065	0.000078	0.000124	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
47 ELECTRICITY	0.004631	0.000045	0.042021	0.003189	0.006314	0.025247	0.001310	0.070317	0.010671	0.079074
48 CONSTN.	0.024921	0.009663	0.016028	0.019244	0.016930	0.041557	0.002795	0.009560	0.006962	0.009278
49 TRANS. SERVICES	0.019081	0.003957	0.010853	0.000456	0.013023	0.026211	0.002957	0.001394	0.010571	0.010575
50 COMMUNICATION	0.006519	0.007543	0.009888	0.001367	0.071429	0.094051	0.001295	0.001738	0.018605	0.002962
51 OTHER SERVICES	0.017303	0.011729	0.018698	0.005923	0.045777	0.098479	0.011726	0.009950	0.055250	0.032270
TOTAL INPUT	0.006475	0.202328	0.493769	0.591344	0.299921	0.000992	0.150468	0.401047	0.425347	0.606770
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.193525	0.797672	0.506231	0.408656	0.700079	0.199008	0.849540	0.510953	0.574653	0.343222



	31	32	33	34	35	36	37	38	39	40
PADDY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER CROPS	0.001701	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000055	0.000371	0.000000
FORESTRY	0.056072	0.007497	0.000044	0.000014	0.001227	0.000061	0.000700	0.001300	0.000322	0.019538
FISHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MINING	0.107897	0.025486	0.014855	0.000000	0.000355	0.000005	0.000753	0.000070	0.000184	0.006326
SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GRANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
WH. FOOD & BEV.	0.029154	0.002611	0.000410	0.003598	0.002585	0.002968	0.004840	0.002929	0.002089	0.000000
COTTON TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
MILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
RT SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER TEXTILES	0.001113	0.001509	0.000322	0.000073	0.000125	0.000000	0.000614	0.000173	0.000181	0.000000
FOOD BASED IND.	0.002506	0.000034	0.000001	0.001361	0.006989	0.000764	0.009103	0.005905	0.004501	0.000000
PAPER & PAPER BASED IND.	0.004766	0.001258	0.000243	0.003056	0.017423	0.000989	0.002201	0.006003	0.004050	0.000000
LEATHER & LEATHER PROD.	0.000032	0.000000	0.000000	0.000033	0.001070	0.000000	0.000000	0.000117	0.000000	0.000000
RUBBER PRODUCTS	0.000000	0.000000	0.000000	0.000011	0.0006975	0.000199	0.000006	0.002391	0.001555	0.000000
PLASTIC PROD.	0.000755	0.000256	0.003765	0.000428	0.001166	0.000025	0.000762	0.001402	0.000969	0.000000
PETROLEUM PROD.	0.058767	0.075471	0.031769	0.007250	0.005073	0.007194	0.017021	0.019452	0.022241	0.034880
COAL TAR PROD.	0.004060	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000042	0.010138
INERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
GLASS BATTI ETC.,	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SYNTHETIC FIB. & RESINS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER CHEM.	0.010367	0.009302	0.033517	0.036538	0.012191	0.002041	0.027145	0.006661	0.026401	0.022129
CEMENT	0.041470	0.000000	0.000000	0.000000	0.000826	0.000000	0.000000	0.000002	0.000000	0.000000
WH. NON-METAL PROD.	0.029893	0.017334	0.000495	0.001067	0.001193	0.000000	0.022026	0.000448	0.000726	0.000000
IRON & STEEL	0.030636	0.392792	0.000064	0.143347	0.219189	0.054789	0.357986	0.235329	0.156264	0.104205
NON-FERROUS METALS	0.000000	0.045607	0.045190	0.097705	0.173729	0.001636	0.021797	0.023296	0.134775	0.017875
TOOLS	0.000025	0.000000	0.000441	0.010302	0.006514	0.001295	0.029187	0.003850	0.006342	0.035751
WH. METAL PROD.	0.000327	0.090904	0.001101	0.020026	0.028819	0.020190	0.028973	0.003042	0.009999	0.000898
EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.100968	0.000000	0.000000	0.000000	0.000000
MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.011350	0.000000	0.027330	0.000000	0.000000	0.000000
ON-ELEC. MACHI.	0.020472	0.020404	0.001120	0.026796	0.016407	0.065337	0.067510	0.087277	0.020735	0.002980
ELEC. MACHINES	0.000032	0.000075	0.000110	0.000409	0.017760	0.006195	0.090446	0.024826	0.194343	0.000000
TRAIL EQUIP.	0.000000	0.000000	0.000000	0.000050	0.000000	0.000000	0.000000	0.016439	0.000000	0.079153
TRACTOR VEHICLES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000583	0.005245	0.000369
WH. TRANS. EQUIPMENT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000372	0.000000	0.001112
MM. & ELE. EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000574	0.000000	0.000000
WATCHES & CLOCKS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
COSTUME & JEWELLERY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OTHER MFG.	0.000252	0.000004	0.000014	0.000139	0.000114	0.000050	0.000462	0.000196	0.000722	0.000000
ELECTRICITY	0.021696	0.001450	0.072923	0.005280	0.013177	0.004870	0.019320	0.014013	0.005642	0.019666
INSTN.	0.020374	0.020290	0.000790	0.025384	0.014605	0.006911	0.037118	0.022265	0.006021	0.001619
TRANS. SERVICES	0.072288	0.012475	0.001539	0.003385	0.003833	0.002249	0.007632	0.003163	0.001549	0.000000
COMMUNICATION	0.004999	0.002176	0.000609	0.002038	0.002678	0.001277	0.005951	0.002791	0.001866	0.000041
OTHER SERVICES	0.091587	0.013411	0.002234	0.016885	0.018451	0.009287	0.024916	0.013529	0.011930	0.000027
TOTAL INPUT	0.620293	0.821545	0.211923	0.406769	0.587539	0.209647	0.815683	0.506317	0.624501	0.356743
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.379707	0.178455	0.780077	0.593231	0.412461	0.710353	0.184317	0.493683	0.375499	0.643257



	41	42	43	44	45	46
1 PADDY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2 WHEAT	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3 OTHER CEREALS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4 PULSES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5 FIBRE CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6 TEA & COFFEE PLANTS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7 OTHER CROPS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8 ANIMAL HUSBANDRY	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9 FORESTRY	0.001393	0.004165	0.000000	0.001718	0.515099	0.003213
10 FISHING	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11 MINING	0.000070	0.000000	0.000000	0.000000	0.000000	0.000198
12 SUGAR	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13 KHANDASARI & BOORA	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14 OTH. FOOD & BEV.	0.002054	0.007159	0.000970	0.000684	0.006197	0.011785
15 COTTON TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16 SILK TEXTILES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18 OTHER TEXTILES	0.000656	0.000000	0.000000	0.000000	0.000728	0.000000
19 WOOD BASED IND.	0.008622	0.007859	0.002149	0.000000	0.021993	0.003565
20 PAPER & PAPER BASED IND.	0.004277	0.002681	0.001268	0.000627	0.003404	0.079315
21 LEATHER & LEATHER PROD.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22 RUBBER PRODUCTS	0.021661	0.005883	0.000000	0.000000	0.000000	0.000000
23 PLASTIC PROD.	0.045648	0.000505	0.000097	0.009869	0.027352	0.002217
24 PETROLEUM PROD.	0.015148	0.020294	0.001108	0.005117	0.017106	0.007329
25 COAL TAR PROD.	0.000000	0.000000	0.000002	0.000000	0.000000	0.000000
26 FERT & PESTICIDES	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
27 AGAR BATTI ETC.,	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
28 SYNTHETIC FIB. & RESINS	0.001620	0.017546	0.000485	0.001013	0.000000	0.000000
29 OTHER CHEM.	0.012219	0.019371	0.002870	0.021205	0.008186	0.019182
30 CEMENT	0.014736	0.000000	0.000000	0.000000	0.000000	0.000000
31 OTH. NON-METAL PROD.	0.003556	0.035613	0.000631	0.011691	0.000000	0.017631
32 IRON & STEEL	0.187766	0.230308	0.033982	0.045937	0.000000	0.100133
33 NON-FERROUS METALS	0.088627	0.038532	0.083284	0.018849	0.000000	0.094367
34 HAND TOOLS	0.007781	0.008268	0.000524	0.000000	0.005411	0.001904
35 OTH. METAL PROD.	0.017091	0.003307	0.000612	0.000332	0.000000	0.011067
36 EARTH MOV. MACH.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
37 MACHINE TOOLS	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38 NON-ELEC. MACH.	0.049286	0.027049	0.004108	0.034565	0.030529	0.039716
39 ELEC. MACHINES	0.004505	0.001072	0.029591	0.000303	0.000000	0.073827
40 RAIL EQUIP.	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
41 MOTOR VEHICLES	0.096321	0.000000	0.000000	0.000000	0.000000	0.000000
42 OTH. TRANS. EQUIPMENT	0.000000	0.207592	0.000000	0.000000	0.000000	0.003198
43 COMM. & ELE. EQUIP.	0.016431	0.000000	0.005604	0.000000	0.000000	0.003134
44 WATCHES & CLOCKS	0.000000	0.025216	0.000000	0.069466	0.000000	0.000000
45 COSTUME & JEWELLERY	0.000000	0.000000	0.002149	0.000000	0.000000	0.000000
46 OTHER. MFG.	0.000095	0.000171	0.000021	0.220409	0.011154	0.025595
47 ELECTRICITY	0.006412	0.012524	0.000453	0.005742	0.049433	0.009117
48 CONSTN.	0.022828	0.024722	0.003952	0.034565	0.030529	0.023720
49 TRANS. SERVICES	0.007279	0.016219	0.000610	0.000430	0.002514	0.032893
50 COMMUNICATION	0.002354	0.009596	0.000463	0.000827	0.030546	0.014032
51 OTHER SERVICES	0.013556	0.042971	0.003169	0.003335	0.026200	0.042391
TOTAL INPUT	0.656329	0.778687	0.178367	0.487430	0.797870	0.618791
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.343671	0.221313	0.821633	0.512570	0.202130	0.381209



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	47	48	49	50	51
1 PADDY	0.000000	0.000000	0.000306		0.002704
2 WHEAT	0.000000	0.000000			0.000809
3 OTHER CEREALS	0.000000	0.000000	0.000049		
4 PULSES	0.000000	0.000000	0.000030		0.000476
5 FIBRE CROPS	0.000000	0.000000			
6 TEA & COFFEE PLANTS	0.000000	0.000000			
7 OTHER CROPS	0.000000	0.053690	0.002756		0.004739
8 ANIMAL HUSBANDRY	0.000000	0.000000			0.028342
9 FORESTRY	0.000000	0.013647	0.000003		
10 FISHING	0.000000	0.000000			0.006062
11 MINING	0.000029	0.019608	0.020878	0.001258	
12 SUGAR	0.000000	0.000000			0.000985
13 KHANDASARI & BOORA	0.000000	0.000000			
14 OTH. FOOD & BEV.	0.004787	0.000000	0.000591		0.003111
15 COTTON TEXTILES	0.000000	0.000000	0.000140		0.000034
16 SILK TEXTILES	0.000000	0.000000			
17 ART SILK & SYN. FIB. TEX.	0.000000	0.000000			
18 OTHER TEXTILES	0.000000	0.000000	0.000029	0.000026	0.003972
19 WOOD BASED IND.	0.000000	0.036202	0.000093	0.003147	0.003989
20 PAPER & PAPER BASED IND.	0.001283	0.000039	0.000752	0.007138	0.011282
21 LEATHER & LEATHER PROD.	0.000000	0.000000			
22 RUBBER PRODUCTS	0.000000	0.000000	0.009178		0.000036
23 PLASTIC PROD.	0.001456	0.000163	0.000002	0.000001	0.000110
24 PETROLEUM PROD.	0.042122	0.010293	0.143560	0.013999	0.001089
25 COAL TAR PROD.	0.000000	0.011367			0.000013
26 FERT & PESTICIDES	0.000000	0.000000			0.000020
27 AGAR BATTI ETC.,	0.000000	0.000000			
28 SYNTHETIC FIB. & RESINS	0.000000	0.000000			
29 OTHER CHEM.	0.004029	0.006350	0.000038		0.044230
30 CEMENT	0.000000	0.047177			
31 OTH. NON-METAL PROD.	0.000000	0.096399	0.000012		0.000422
32 IRON & STEEL	0.000000	0.126052	0.000307		0.000011
33 NON-FERROUS METALS	0.000000	0.000000			
34 HAND TOOLS	0.000000	0.000000			
35 OTH. METAL PROD.	0.000526	0.000000			
36 EARTH MOV. MACH.	0.000000	0.000000			
37 MACHINE TOOLS	0.000000	0.000000			
38 NON-ELEC. MACHI.	0.002168	0.000000	0.002655	0.000243	0.000716
39 ELEC. MACHINES	0.000053	0.025310	0.012779	0.001212	0.000782
40 RAIL EQUIP.	0.000000	0.000000	0.037886		
41 MOTOR VEHICLES	0.000000	0.000201	0.002508	0.007881	0.000626
42 OTH. TRANS. EQUIPMENT	0.000000	0.000000	0.011561	0.000189	0.000719
43 COMM. & ELE. EQUIP.	0.000000	0.000000	0.000451	0.002819	0.000031
44 WATCHES & CLOCKS	0.000000	0.000000			
45 COSTUME & JEWELLERY	0.000000	0.000000			
46 OTHER. MFG.	0.000485	0.001081	0.001571	0.002534	0.014203
47 ELECTRICITY	0.157304	0.000551	0.018566	0.008318	0.003970
48 CONSTN.	0.002010	0.000000	0.074469	0.024002	0.033547
49 TRANS. SERVICES	0.000733	0.022448	0.018499	0.028102	0.034701
50 COMMUNICATION	0.006730	0.000247	0.001707		0.000622
51 OTHER SERVICES	0.032492	0.113787	0.053440	0.014319	0.081534
TOTAL INPUT	0.427805	0.640400	0.233326	0.123090	0.307417
GROSS OUTPUT	1.000000	1.000000	1.000000	1.000000	1.000000
GROSS VALUE ADDED	0.572195	0.359600	0.806570	0.876910	0.692583







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10	11	12	13	14	15	16	17	18	19
1 0.000057191	0.000109519	0.000757025	0.000776489	0.015203670	0.000399672	0.000979306	0.000302132	0.000536922	0.000349265
2 0.000070736	0.000089269	0.000353504	0.000469008	0.047611511	0.000640240	0.004143469	0.000477336	0.000045369	0.000400250
3 0.000039895	0.000043821	0.000210053	0.000270029	0.030630501	0.000306560	0.003326737	0.000205570	0.000506199	0.000202005
4 0.000142508	0.000231985	0.001177727	0.001142902	0.056797555	0.002340407	0.021805493	0.001415152	0.001601100	0.000031160
5 0.000054667	0.000010524	0.000007586	0.000091046	0.000003117	0.018911528	0.000376030	0.000633870	0.003125411	0.000050665
6 0.000042581	0.000044453	0.000146563	0.000229695	0.034397110	0.000414909	0.001232954	0.000300045	0.000545458	0.000302263
7 0.000742721	0.001941396	0.631004163	0.557068719	0.071626435	0.010594998	0.169070228	0.006841072	0.009944520	0.005097697
8 0.000400520	0.000055400	0.014531977	0.013454015	0.035631116	0.003604707	0.465705352	0.002379091	0.004246474	0.002167610
9 0.000956291	0.001202449	0.005119359	0.014046008	0.002011306	0.007664365	0.007560062	0.007332092	0.010603188	0.237044482
10 1.000075600	0.000168006	0.000180581	0.000200939	0.007415097	0.000412045	0.000612114	0.000330531	0.000586017	0.000412107
11 0.001392714	1.011419185	0.010793762	0.013130474	0.006011137	0.022279086	0.022540132	0.012493003	0.013261542	0.008999728
12 0.000021263	0.000042227	1.010809915	0.000001036	0.00415625	0.000244963	0.000235646	0.000157211	0.000204055	0.000119508
13 0.000027324	0.000059231	0.002727465	1.061509126	0.00015269	0.000709394	0.000127215	0.000306314	0.000353943	0.000231927
14 0.001312577	0.001370207	0.004517040	0.007080365	1.051529596	0.012709632	0.030005927	0.009495520	0.010013005	0.009317287
15 0.003389724	0.000650991	0.005421639	0.005636201	0.00179645	1.172956188	0.023169199	0.535499240	0.193839063	0.003136602
16 0.000054682	0.000002981	0.000071373	0.000075027	0.00013779	0.000714450	1.559719442	0.000335369	0.003305225	0.000006978
17 0.000512233	0.000033917	0.000601320	0.000715374	0.001180492	0.021000123	0.000024163	1.008864863	0.030019612	0.000100415
18 0.021665752	0.001070233	0.020041642	0.029492104	0.024501475	0.014411294	0.073190041	0.010356877	1.312194236	0.002121390
19 0.001207223	0.001256171	0.001933180	0.002027632	0.01715269	0.003714483	0.000907393	0.017258446	0.013835942	1.217573226
20 0.001323377	0.002939472	0.006049877	0.004990074	0.017767913	0.021517603	0.000486825	0.013040147	0.023003944	0.030469474
21 0.000016757	0.000034421	0.000050375	0.000050660	0.000157117	0.000329741	0.000000017	0.000103492	0.000302334	0.000322160
22 0.000302519	0.000159985	0.000137399	0.000270903	0.000166390	0.000305831	0.000207977	0.000306792	0.000662127	0.002597397
23 0.000149860	0.000201221	0.000813990	0.000909390	0.001410087	0.001820703	0.001064260	0.003163077	0.003760937	0.006224259
24 0.023519573	0.044707910	0.027204292	0.036050900	0.021265901	0.051914945	0.020497935	0.037160556	0.047730041	0.052351092
25 0.000728602	0.001520232	0.001659503	0.001520761	0.000941705	0.007675901	0.001814575	0.004300670	0.004166275	0.002334073
26 0.000054718	0.000111953	0.000570133	0.024079345	0.014754502	0.001596951	0.000092560	0.000865904	0.000815596	0.000353044
27 0.000009318	0.000019880	0.000239074	0.000141310	0.000223075	0.000264049	0.000312861	0.000142111	0.000122719	0.000073303
28 0.002428255	0.00445466	0.002316739	0.002477907	0.001194521	0.015071909	0.006138358	0.077644100	0.005224202	0.043280066
29 0.012793663	0.027585994	0.061976077	0.031111524	0.019929026	0.372043773	0.050845722	0.198820725	0.145456094	0.050600226
30 0.000369177	0.001067034	0.005262100	0.003273660	0.002929732	0.004097055	0.002502253	0.002924479	0.005137269	0.002579914
31 0.003028204	0.004234402	0.009530338	0.005626060	0.010330370	0.027057741	0.000559302	0.016304460	0.010353700	0.000920914
32 0.019466992	0.020177174	0.013246544	0.016951721	0.01111454	0.065181006	0.026297156	0.041752739	0.065046025	0.032733393
33 0.003307029	0.003141802	0.004240155	0.003730885	0.005276290	0.008316058	0.009365198	0.005487427	0.010160798	0.005542434
34 0.000380615	0.000217579	0.000130069	0.000189401	0.000127211	0.000352920	0.000304343	0.000335906	0.001101091	0.005374182
35 0.002212240	0.002304864	0.002254700	0.002339221	0.004040120	0.009814324	0.004532365	0.005993615	0.015070700	0.004057911
36 0	0	0	0	0	0	0	0	0	0
37 0.000027390	0.000028535	0.000020832	0.000029942	0.000058719	0.000119372	0.000064613	0.000092455	0.000193914	0.001642030
38 0.004174566	0.036127228	0.017262221	0.022671980	0.011105358	0.043921070	0.034673144	0.03749237	0.005231159	0.033367065
39 0.000494827	0.002200204	0.001516023	0.002134339	0.001214775	0.003018014	0.002965179	0.003049812	0.006506702	0.005006662
40 0.000206945	0.000029510	0.000581847	0.001165456	0.000567427	0.001442649	0.001205312	0.001166215	0.002713332	0.003230489
41 0.000067585	0.000130240	0.000225684	0.000470783	0.000202043	0.000439753	0.000376931	0.000362875	0.000732057	0.003156243
42 0.039605766	0.000115091	0.000139641	0.000338650	0.000457206	0.000317073	0.000307922	0.000249526	0.000560487	0.001149029
43 0.000036529	0.000114146	0.000094333	0.000125001	0.000052722	0.000180587	0.000187473	0.000149394	0.001397744	0.000200667
44 0.001073256	0.000003140	0.000003784	0.000009176	0.000012309	0.000008592	0.000000344	0.000006761	0.000015405	0.000031150
45 0.000063954	0.000003542	0.000003030	0.000007337	0.000014033	0.000044220	0.000021632	0.000031596	0.000006649	0.000000055
46 0.000457065	0.003070912	0.000554216	0.000077054	0.000500764	0.001002771	0.001206221	0.001245647	0.001095147	0.001000314
47 0.004195031	0.030546089	0.017048493	0.040090559	0.013792044	0.064952054	0.024952002	0.067640046	0.049113467	0.037600730
48 0.004041116	0.017207614	0.020701127	0.026940431	0.015305965	0.042400017	0.041170030	0.036750077	0.003704600	0.042606096
49 0.003215965	0.004485011	0.006640630	0.018406335	0.000969951	0.015245347	0.014236234	0.011729047	0.020041109	0.004227706
50 0.001170000	0.001494007	0.006107579	0.000107977	0.003760308	0.012269203	0.006003805	0.010034263	0.010179963	0.011150318
51 0.010903875	0.026140225	0.024624373	0.039560025	0.024317062	0.053350953	0.057527793	0.043670054	0.077501334	0.057330711



(I-A)<sup>-1</sup> MATRIX KARNATAKA STATE 1983-84

20	21	22	23	24	25	26	27	28	29
1 0.000920382	0.000602920	0.000171168	0.000273603	0.000345973	0.000429753	0.001179281	0.000143315	0.000249567	0.000725206
2 0.002177448	0.004270147	0.002295044	0.000418961	0.000564209	0.000720879	0.001991109	0.000213595	0.000309023	0.001331701
3 0.001170405	0.001157364	0.000136457	0.000247411	0.000340747	0.000430992	0.001920044	0.000125500	0.000210151	0.000011375
4 0.003200369	0.021072943	0.000462096	0.0000887403	0.002555902	0.001021063	0.00251771	0.000691332	0.001306250	0.006386021
5 0.000078176	0.001023100	0.000031537	0.000040399	0.000132309	0.000012354	0.000390091	0.000031538	0.000003085	0.000337030
6 0.001515808	0.001420540	0.000144288	0.000260506	0.000371022	0.000471125	0.00173200	0.000135065	0.000250043	0.000888574
7 0.012908571	0.162052376	0.035338408	0.004759538	0.010993155	0.004149755	0.013709120	0.003511002	0.006062637	0.023414063
8 0.006602707	0.437052058	0.001545418	0.001684987	0.002201125	0.002425297	0.00677175	0.000957050	0.001593022	0.00435946
9 0.101114059	0.006586381	0.001720306	0.002803452	0.005108694	0.006572357	0.01114486	0.003572102	0.003027736	0.000911052
10 0.000652022	0.000748453	0.000161225	0.000322146	0.000380729	0.000489598	0.001313564	0.000169106	0.000290267	0.000729346
11 0.131792442	0.008134754	0.016410252	0.005206986	0.010410213	0.005730325	0.027710005	0.014764774	0.005986178	0.021391537
12 0.000517612	0.000283333	0.000054188	0.000112459	0.000266784	0.000137272	0.00045221	0.000088230	0.000146796	0.000630036
13 0.006710599	0.000161501	0.0000081077	0.000200013	0.000040172	0.000092995	0.000402500	0.000277192	0.000388479	0.002146535
14 0.046724930	0.063309080	0.004447700	0.000276732	0.011436790	0.014522493	0.040171250	0.004188149	0.007707610	0.027300363
15 0.004029824	0.000060011	0.000003712	0.000016366	0.000009546	0.000002402	0.000035802	0.000002187	0.000030802	0.000022215
16 0.000021572	0.000060011	0.000003712	0.000016366	0.000009546	0.000002402	0.000035802	0.000002187	0.000030802	0.000022215
17 0.000271670	0.0046660238	0.000057800	0.000172428	0.000300729	0.000489598	0.001313564	0.000169106	0.000290267	0.000729346
18 0.007715954	0.009592940	0.001060716	0.006130971	0.001972601	0.000006642	0.013787591	0.000762752	0.011421974	0.004160174
19 0.003006677	0.003865525	0.0004043887	0.002727327	0.002693716	0.002104709	0.008980383	0.002650418	0.002049560	0.002030330
20 1.320534942	0.008279936	0.004116216	0.010886915	0.019637016	0.000255765	0.029339315	0.021049500	0.011069270	0.048138374
21 0.010878008	1.436588141	0.000039630	0.000121305	0.000179250	0.000070026	0.000282560	0.000184406	0.000111257	0.000420001
22 0.000704370	0.042943046	1.032041773	0.000400019	0.000285924	0.00032131	0.000895888	0.000109056	0.000208169	0.000414798
23 0.002530710	0.002952701	0.005545132	1.0308993959	0.000690937	0.001095312	0.006892929	0.000427336	0.000004100	0.001454651
24 0.071794029	0.034305564	0.020730655	0.044997605	1.307648630	0.074230862	0.007766632	0.014839525	0.021951071	0.047377100
25 0.003553327	0.002474532	0.001348221	0.002572890	0.033918580	1.063566642	0.005965307	0.001766397	0.003469625	0.016523708
26 0.001117765	0.0008621943	0.001501655	0.000324051	0.000670642	0.000367207	1.235160055	0.000210335	0.000385304	0.001478286
27 0.001931645	0.000098037	0.000034341	0.000066970	0.000202893	0.000032193	0.006124062	1.000722556	0.00013066	0.000722029
28 0.000582922	0.011335377	0.020471006	0.393411776	0.001012100	0.000775271	0.004590070	0.000350752	1.316593477	0.001786402
29 0.115215519	0.072400278	0.037371740	0.090103051	0.459608240	0.031522169	0.194494231	0.104923294	0.207064007	1.180760146
30 0.002937074	0.004432213	0.001050743	0.002319089	0.004094296	0.001669077	0.006570600	0.000932944	0.002497577	0.006736201
31 0.013382122	0.011270326	0.005242184	0.009497283	0.030900905	0.005172561	0.053390896	0.008280706	0.015266347	0.071227982
32 0.029772243	0.038414780	0.01113809	0.030948738	0.026954235	0.018479746	0.057582002	0.005601560	0.024632919	0.020846781
33 0.009451561	0.006926051	0.017411709	0.010239706	0.005590507	0.002963150	0.076072982	0.004353040	0.003972030	0.003518664
34 0.000503833	0.000443686	0.000309660	0.000354158	0.000267938	0.000207169	0.000675015	0.000076031	0.000211295	0.000243268
35 0.004191838	0.007668569	0.001511312	0.015693367	0.005728196	0.003467459	0.015018847	0.001002587	0.004389505	0.009692259
36 0.000053986	0.000094530	0.000018997	0.000186690	0.000070358	0.000043313	0.000196311	0.000024503	0.000053097	0.000116005
37 0.041397657	0.040761004	0.015157702	0.036698931	0.036299497	0.024329326	0.072487846	0.006454390	0.020909513	0.018152551
38 0.003764140	0.004465189	0.001232543	0.003855476	0.003094126	0.002418270	0.006871099	0.000731576	0.002339704	0.002961654
39 0.001506144	0.002550924	0.000560355	0.001383648	0.001159719	0.001292059	0.003497295	0.000381395	0.000071648	0.001321448
40 0.001360738	0.000741609	0.000208672	0.000424253	0.000387775	0.001041527	0.001978933	0.000163426	0.000256591	0.000670471
41 0.000423170	0.000725110	0.000139786	0.000334998	0.000266472	0.000417187	0.001066972	0.000128565	0.000190999	0.000485110
42 0.000181409	0.000210438	0.000075232	0.000159931	0.000151257	0.000316036	0.000621457	0.000036409	0.000110619	0.000154072
43 0.000011467	0.000019649	0.000003708	0.000009078	0.000007221	0.000011305	0.000020813	0.000003403	0.000005175	0.000013145
44 0.000069012	0.000090366	0.000003452	0.000018911	0.000006090	0.000003304	0.000043131	0.000003102	0.000003461	0.000014355
45 0.001021565	0.001581176	0.000549562	0.001036753	0.001035658	0.001287458	0.003360005	0.000517575	0.000087603	0.001863460
46 0.068662405	0.023624321	0.018877604	0.093001050	0.018647240	0.013980185	0.063012458	0.006968292	0.118259249	0.026632725
47 0.041879488	0.056743256	0.015449378	0.035396321	0.036011550	0.028174459	0.079659067	0.007015466	0.028806037	0.020327263
48 0.018642164	0.04080377	0.007041423	0.017705251	0.012432150	0.020047600	0.053548309	0.006460209	0.000604109	0.024220912
49 0.010830780	0.013985820	0.009387637	0.014451341	0.014114573	0.077705189	0.123940951	0.003976053	0.000092069	0.025642758
50 0.054143517	0.073408198	0.021511592	0.043600032	0.049731489	0.064163297	0.174064155	0.023171151	0.039071874	0.000002217



(X-A)<sup>-1</sup> MATRIX KARNATAKA STATE 1983-84

	30	31	32	33	34	35	36	37	38	39
1	0.000408860	0.000985727	0.000387581	0.000086293	0.00021367	0.000294508	0.000156878	0.000479016	0.000269801	0.00025451
2	0.000664054	0.001756468	0.000566869	0.000133295	0.00031541	0.000422130	0.000268405	0.000723334	0.000408784	0.000388934
3	0.000395466	0.001065059	0.000333094	0.000078821	0.000215248	0.000248115	0.000161282	0.000426265	0.000241167	0.000229451
4	0.001015046	0.002437308	0.001141771	0.000414094	0.00081978	0.000804324	0.000418195	0.001338304	0.000746312	0.000847953
5	0.000350851	0.000044683	0.000043149	0.000019294	0.00001511	0.000025954	0.000008350	0.000042049	0.000022832	0.000030922
6	0.000430847	0.001166350	0.000359777	0.000085563	0.00021738	0.000265869	0.000176310	0.000461946	0.000261231	0.000248920
7	0.0004615273	0.010312771	0.007519517	0.002070263	0.00492148	0.005173982	0.002178094	0.008738993	0.005198649	0.00496389
8	0.002489469	0.005226711	0.002483434	0.000546805	0.00155354	0.002331561	0.000907366	0.003021346	0.001744392	0.001612044
9	0.003310143	0.062300176	0.019372263	0.001180027	0.00511074	0.010065958	0.003056103	0.016330646	0.010620943	0.007773103
10	0.000470491	0.001047344	0.000460541	0.000100473	0.000100234	0.000345304	0.000174063	0.000567031	0.000317492	0.000300172
11	0.295464994	0.133797333	0.057634177	0.017882460	0.01428482	0.022352200	0.006587116	0.034574782	0.019607846	0.018246829
12	0.000135886	0.000307678	0.000150150	0.000047446	0.00012011	0.000109653	0.000053542	0.000179189	0.000099898	0.000107544
13	0.000126408	0.000181488	0.000247295	0.000120089	0.00013747	0.000254369	0.000059587	0.000300297	0.000169275	0.000222082
14	0.013280898	0.035952056	0.011090164	0.002637409	0.007152321	0.000195448	0.005434786	0.014239551	0.000052472	0.007673001
15	0.021754075	0.002754382	0.002660909	0.001194577	0.001139220	0.001604404	0.000515587	0.002599259	0.001411216	0.001912826
16	0.000361117	0.000024435	0.000014067	0.000002789	0.000014939	0.000006620	0.000002138	0.000011910	0.000006367	0.000006168
17	0.003374775	0.000245043	0.000155484	0.000039180	0.00016305	0.000081631	0.000025169	0.000136101	0.000073468	0.000077716
18	0.143228052	0.009306638	0.005146056	0.000861916	0.001639688	0.002339015	0.000756218	0.004276250	0.002200063	0.002079868
19	0.003349856	0.006891683	0.005002152	0.000911409	0.004722637	0.011991871	0.003097893	0.018270556	0.01417043	0.009472252
20	0.010384976	0.014236182	0.015275337	0.004166177	0.010555251	0.030736952	0.005099201	0.025777071	0.015425704	0.015631250
21	0.000129890	0.000187966	0.000396904	0.000041640	0.0001300319	0.0001918100	0.000119273	0.000434003	0.000400185	0.000223956
22	0.000453114	0.001082042	0.001743327	0.000090921	0.000662844	0.000117747	0.000033079	0.001622457	0.003401243	0.002791036
23	0.001328611	0.001365507	0.001821546	0.0004360153	0.001405289	0.002799513	0.000466341	0.002442708	0.002500703	0.002966904
24	0.053651330	0.118500298	0.205474379	0.053210406	0.054217990	0.074140372	0.034224779	0.130699979	0.092427778	0.093748202
25	0.002195827	0.000444826	0.006709083	0.002071642	0.002005212	0.002939068	0.001250510	0.005335309	0.003562704	0.003613064
26	0.000391501	0.000900968	0.000483455	0.000130407	0.000326367	0.000340408	0.000164915	0.000575917	0.000336208	0.000324403
27	0.000043384	0.000064060	0.00002784	0.000040327	0.000058148	0.000000210	0.000020033	0.000090643	0.000055429	0.000073129
28	0.010040832	0.001787942	0.002370613	0.001869563	0.001345832	0.005086338	0.001073009	0.003400737	0.008577081	0.005523300
29	0.045769855	0.066864009	0.105794576	0.061484379	0.074874995	0.063050377	0.021004091	0.106324499	0.057195501	0.009296207
30	1.000703813	0.045957236	0.005519445	0.000950663	0.002000490	0.003690073	0.001232340	0.006368413	0.003273953	0.002495343
31	0.010797538	0.041618732	0.044850283	0.000523971	0.015095537	0.017314247	0.000866486	0.051635051	0.017605206	0.016152420
32	0.040440939	0.085004189	1.755361493	0.009493072	0.285627158	0.430386722	0.157482609	0.751073092	0.479322195	0.370046328
33	0.007742944	0.008747515	0.118077620	1.049119890	0.128267629	0.222443023	0.020950215	0.103275542	0.066466033	0.205956500
34	0.000459183	0.000511112	0.001669164	0.000564927	1.011088379	0.007991018	0.002245678	0.032570468	0.005791609	0.000764107
35	0.018050652	0.009929621	0.165832088	0.002663253	0.048554799	1.071706208	0.038508824	0.104457675	0.049568396	0.040910954
36	0	0	0	0	0	0	1.112306933	0	0	0
37	0.000224439	0.000124862	0.001942733	0.000032267	0.000572767	0.012522769	0.000454117	1.029340781	0.000593327	0.000583188
38	0.041629703	0.039973216	0.069400730	0.012770601	0.045098872	0.043319910	0.008367659	0.117099561	1.120100417	0.049312287
39	0.005074417	0.005234173	0.009206744	0.001154193	0.004057203	0.020250255	0.013016693	0.125000447	0.037903563	1.245517559
40	0.001534281	0.004326529	0.002613307	0.000390618	0.001390645	0.001453457	0.001803974	0.00335525	0.020650747	0.001416478
41	0.000406597	0.001012791	0.000704292	0.000107850	0.000334769	0.000577137	0.000209163	0.001475411	0.001327503	0.007560516
42	0.000381331	0.001503040	0.000611965	0.000003991	0.000264258	0.000327040	0.000182417	0.000612351	0.000849471	0.000270017
43	0.000272567	0.000236398	0.000247357	0.000047167	0.000149331	0.000169067	0.000249319	0.000456253	0.002005536	0.001001239
44	0.000010333	0.000040730	0.000016583	0.000002276	0.000007161	0.000008884	0.000004943	0.000016593	0.000023019	0.000007317
45	0.000422938	0.000028944	0.000017361	0.000002015	0.000010974	0.000015346	0.000003266	0.000015408	0.000014607	0.000009222
46	0.002336713	0.003127026	0.001695507	0.000001177	0.001004249	0.001185462	0.000537756	0.002305012	0.001220681	0.001808497
47	0.116730723	0.051562506	0.192245492	0.094680045	0.050470036	0.004713438	0.027410635	0.118324554	0.077453045	0.068746218
48	0.033252403	0.046905121	0.068108149	0.011992499	0.042658115	0.040339464	0.010610020	0.080741552	0.049059636	0.030502272
49	0.019214410	0.087013973	0.033404179	0.004094941	0.012006208	0.016519619	0.007436203	0.030700065	0.016112291	0.013019407
50	0.007420753	0.014690908	0.010013797	0.003000264	0.005769525	0.007347054	0.003251064	0.013015682	0.007330092	0.006932383
51	0.062430641	0.131671286	0.063293726	0.013559237	0.040550549	0.047593170	0.022500019	0.077260245	0.043168693	0.040745413



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	40	41	42	43	44	45	46
1	0.000105242	0.000284994	0.000614925	0.000065884	0.000259569	0.000348913	0.000589950
2	0.000160029	0.000407691	0.000905361	0.000108926	0.000417338	0.000499366	0.001037464
3	0.000094593	0.000238310	0.000530492	0.000065109	0.000249136	0.000290655	0.000628713
4	0.000458667	0.000792741	0.001543754	0.000202744	0.000763804	0.000774416	0.001582411
5	0.000020336	0.000034108	0.000038743	0.000006046	0.000021948	0.000043119	0.000030324
6	0.00010244	0.000257086	0.000574440	0.000071014	0.000270845	0.000314182	0.000606082
7	0.002496592	0.006271366	0.008803073	0.00113036	0.005596007	0.005595506	0.007266047
8	0.000604800	0.001850615	0.003804729	0.00039243	0.001603797	0.002216391	0.003420684
9	0.024467028	0.011043865	0.019260599	0.003048151	0.009963537	0.524486380	0.018330052
10	0.000122266	0.000343770	0.000744741	0.00007435	0.000292017	0.000430712	0.000624906
11	0.015867643	0.024698845	0.029839405	0.00475941	0.014958321	0.006934057	0.027017415
12	0.000053622	0.000107820	0.000215241	0.00002547	0.000100328	0.000115554	0.000212809
13	0.000127674	0.000183216	0.000244594	0.00004447	0.000253539	0.000131667	0.000687152
14	0.003157722	0.007924714	0.017707180	0.00218911	0.008348825	0.009604698	0.021173198
15	0.001258878	0.002110298	0.002392338	0.000373173	0.001356457	0.002668675	0.00187021
16	0.000003042	0.000014746	0.000009594	0.00000126	0.000004773	0.000033600	0.000007092
17	0.000042362	0.000153887	0.000113268	0.000014223	0.000058875	0.000322502	0.000086954
18	0.000950496	0.005558119	0.003373708	0.000415973	0.001638806	0.013173557	0.002469557
19	0.001510144	0.015699988	0.017230471	0.00351393	0.004084744	0.033480951	0.008858757
20	0.004882704	0.014491872	0.016246074	0.003514074	0.031652350	0.01480275	0.115115919
21	0.000126256	0.000240616	0.000252717	0.000045184	0.000306380	0.000147583	0.001021461
22	0.000311558	0.025661088	0.008730909	0.000192514	0.000561302	0.000547934	0.001144998
23	0.000517376	0.053849006	0.002298975	0.000725258	0.012295143	0.029235588	0.003751957
24	0.080893377	0.087593294	0.131786890	0.017236763	0.044444273	0.043805072	0.068202437
25	0.014447619	0.003468178	0.005214433	0.000709852	0.002544818	0.002147482	0.003137428
26	0.000156111	0.000384402	0.000625965	0.000078530	0.000355101	0.000376519	0.000586717
27	0.000042867	0.0000060612	0.000082818	0.000014665	0.000079778	0.000043236	0.000206635
28	0.000594443	0.025083677	0.031815584	0.001282340	0.007073035	0.013431962	0.003316561
29	0.063960231	0.068685606	0.100760091	0.016651403	0.059751323	0.035699335	0.072349641
30	0.001383207	0.020008852	0.006501420	0.000662296	0.004191334	0.003375668	0.004008971
31	0.009492561	0.021184092	0.069975800	0.004030276	0.030039307	0.009174377	0.032936560
32	0.216892625	0.417316023	0.555663602	0.075679106	0.175895892	0.041183410	0.249151742
33	0.040091625	0.141438404	0.094747385	0.098717086	0.063705862	0.008069509	0.137666871
34	0.039539055	0.009779676	0.011538843	0.000959415	0.001170881	0.006022025	0.003386061
35	0.022767061	0.060794408	0.058059106	0.008428370	0.020861086	0.005250651	0.037240185
36	0	0	0	0	0	0	0
37	0.000267648	0.000729915	0.000699992	0.000102999	0.000249808	0.000104946	0.000446127
38	0.018518211	0.084530016	0.069855196	0.010126108	0.064001872	0.047263062	0.065916038
39	0.002012616	0.013292429	0.009341189	0.037879035	0.027550758	0.007497024	0.099869475
40	1.0086557724	0.002417559	0.003008134	0.000316128	0.001888879	0.001680497	0.003157712
41	0.000820591	1.107173349	0.000990309	0.000313208	0.000597088	0.005705219	0.001550276
42	0.001662277	0.000429771	1.262776691	0.000066989	0.000411989	0.000672665	0.001105587
43	0.000077904	0.018556633	0.000308218	1.005695883	0.000908288	0.000304150	0.003571857
44	0.000045045	0.000011646	0.034219335	0.000001815	1.074663278	0.000018228	0.000029959
45	0.000003499	0.000057265	0.000011664	0.002162930	0.000008243	1.000040244	0.000019259
46	0.000485550	0.001215165	0.010021552	0.00029205	0.243976713	0.013750899	1.027965755
47	0.053641644	0.075186841	0.094492722	0.018265763	0.040261602	0.072458821	0.060395405
48	0.016898204	0.052222762	0.068541867	0.009269064	0.058092027	0.059065712	0.050033778
49	0.006506478	0.022069355	0.042788762	0.003288589	0.018138332	0.020329055	0.048144817
50	0.003878100	0.008036086	0.019201851	0.001601818	0.007945549	0.035879588	0.020371236
51	0.016559455	0.047649581	0.102611474	0.009762509	0.038627564	0.059979714	0.078880885

1.755717220 2.461594378 2.921124248 1.344675098 2.083373343 2.130688667 2.291268771  
0.917860331 1.286881398 1.527116120 0.702974213 1.089153609 1.118594342 1.197835303

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47	48	49	50	51
1 0.000360356	0.000710830	0.000678738	0.000110781	0.003820449
2 0.000478021	0.000530676	0.000282256	0.000078844	0.001554713
3 0.000273012	0.000259296	0.000187558	0.000039314	0.000415285
4 0.000783956	0.000961711	0.000754391	0.000163036	0.002696942
5 0.000017406	0.000039536	0.000030828	0.000005644	0.000046086
6 0.000293628	0.000254878	0.000138422	0.000037948	0.000288381
7 0.000549521	0.001383625	0.011333883	0.002518333	0.021864457
8 0.002439894	0.006198803	0.002898645	0.000831002	0.032693168
9 0.005572100	0.03201605	0.005136079	0.002722862	0.004642780
10 0.000464772	0.001017027	0.000544530	0.000157012	0.006777887
11 0.009684251	0.056834014	0.029810894	0.003823103	0.008134942
12 0.000122169	0.000210396	0.000133397	0.000036010	0.001168252
13 0.000150321	0.000125991	0.000169112	0.000076241	0.000219426
14 0.009051128	0.007856656	0.004254554	0.001170986	0.008889391
15 0.001073729	0.002442536	0.001903415	0.000350994	0.002814634
16 0.000004573	0.00002424	0.000005120	0.000001564	0.000017927
17 0.000053247	0.000239261	0.000068264	0.000018100	0.000189958
18 0.001623826	0.009380410	0.001651371	0.000559518	0.006697733
19 0.006259043	0.047143189	0.005268854	0.005514554	0.007796684
20 0.0016144002	0.009042744	0.007154893	0.011101244	0.021638448
21 0.000166983	0.000124652	0.000074709	0.0000095332	0.000184741
22 0.000478498	0.000034150	0.010212816	0.000548437	0.000565749
23 0.002240218	0.001045235	0.000934414	0.000566023	0.000489386
24 0.003240298	0.067814378	0.297529431	0.028475985	0.018640607
25 0.003708403	0.014943380	0.007039601	0.001165417	0.001879315
26 0.000498158	0.002793683	0.000598847	0.00013292	0.001470986
27 0.000049680	0.000054262	0.000058453	0.000023500	0.000075410
28 0.001998866	0.002952261	0.001508436	0.000584816	0.001129807
29 0.0043172282	0.049734840	0.002513483	0.013171996	0.067526558
30 0.005940015	0.053505565	0.005339840	0.001784790	0.002778198
31 0.014952206	0.109978239	0.015600092	0.004198637	0.009813329
32 0.073961479	0.247369955	0.051832276	0.013781809	0.019169106
33 0.009606919	0.022954281	0.010448554	0.003179456	0.004612243
34 0.000682774	0.000795758	0.002027911	0.000212122	0.000244221
35 0.000499863	0.024956125	0.006152943	0.001685201	0.002655782
36 0	0	0	0	0
37 0.000107354	0.000352720	0.000078674	0.000026858	0.000041162
38 0.113913910	0.020087498	0.016474366	0.004099940	0.006248904
39 0.007721107	0.035074611	0.020424844	0.003624215	0.005090198
40 0.002439995	0.002234886	0.042598764	0.001371166	0.001928760
41 0.000441884	0.001405578	0.011145972	0.009136292	0.001427090
42 0.000285515	0.000881342	0.015172334	0.000733536	0.001932686
43 0.000341807	0.000161415	0.000735023	0.003026501	0.000188349
44 0.000007737	0.000023883	0.000411147	0.000019877	0.000052372
45 0.000006221	0.000028447	0.000006758	0.000006554	0.000020908
46 0.001904093	0.004590509	0.003352355	0.003109513	0.016509426
47 1.200978738	0.042625007	0.035669732	0.013982485	0.012524042
48 0.109231263	1.026531965	0.0909719	0.030323925	0.045697312
49 0.009877780	0.045602625	1.028255207	0.031548154	0.044166473
50 0.010837859	0.006949484	0.005942293	1.001039402	0.011989454
51 0.066322713	0.158789234	0.004963143	0.024562390	1.107932005
1.837014392	2.181867904	1.830479148	1.225536519	1.519352644
0.960361167	1.140644959	0.956944648	0.640690546	0.794292785



Table : 5

## SIMILARITY INDEX BETWEEN CENSUS SECTOR &amp; NON-CENSUS SECTOR

13 KHANDASARI & BOORA	0.990277
14 OTH. FOOD & BEV.	0.400483
15 COTTON TEXTILES	0.208374
16 SILK TEXTILES	0.977101
17 ART SILK & SYN. FIB. TEX.	0.121278
18 OTHER TEXTILES	0.898639
19 WOOD BASED IND.	0.757068
20 PAPER & PAPER BASED IND.	0.726890
21 LEATHER & LEATHER PROD.	0.948575
22 RUBBER PRODUCTS	0.487313
23 PLASTIC PROD.	0.624493
26 FERT & PESTICIDES	0.289883
27 AGAR BATTI ETC.,	0.973978
28 SYNTHETIC FIB. & RESINS	0.852281
29 OTHER CHEM.	0.409274
31 OTH. NON-METAL PROD.	0.547269
32 IPON & STEEL	0.935025
33 NON-FERROUS METALS	0.349225
34 HAND TOOLS	0.802335
35 OTH. METAL PROD.	0.973841
36 EARTH MOV. MACH.	0.844201
37 MACHINE TOOLS	0.954050
38 NON-ELEC. MACHI.	0.946050
39 ELEC. MACHINES	0.827716
40 RAIL EQUIP.	0.847091
41 MOTOR VEHICLES	0.926176
42 OTH. TRANS. EQUIPMENT	0.578527
43 COMM. & ELE. EQUIP.	0.899371
44 WATCHES & CLOCKS	0.527900
46 OTHER. MFG.	0.786773



Table : 6

Value Added Rates by Census &amp; Non-Census Categories

	CENSUS	NON-CENSUS
13 KHANDASARI & BOORA	0.274645	0.268107
14 OTH. FOOD & BEV.	0.737783	0.233646
15 COTTON TEXTILES	0.444292	0.329850
16 SILK TEXTILES	0.342704	0.098473
17 ART SILK & SYN. FIB. TEX.	0.205353	0.746786
18 OTHER TEXTILES	0.369128	0.217481
19 WOOD BASED IND.	0.501820	0.348716
20 PAPER & PAPER BASED IND.	0.390876	0.243919
21 LEATHER & LEATHER PROD.	0.255258	0.187500
22 RUBBER PRODUCTS	0.804685	0.395123
23 PLASTIC PROD.	0.779252	0.172302
26 FERT & PESTICIDES	0.148749	0.251451
27 AGAR BATTI ETC.,	0.928893	0.187652
28 SYNTHETIC FIB. & RESINS	0.534533	0.215692
29 OTHER CHEM.	0.786577	0.272613
31 OTH. NON-METAL PROD.	0.373243	0.382058
32 IRON & STEEL	0.202611	0.047489
33 NON-FERROUS METALS	0.709811	0.775515
34 HAND TOOLS	0.520466	0.628597
35 OTH. METAL PROD.	0.349742	0.436225
36 EARTH MOV. MACH.	0.625354	0.751433
37 MACHINE TOOLS	0.210158	0.151395
38 NON-ELEC. MACHI.	0.494001	0.493548
39 ELEC. MACHINES	0.508928	0.298545
40 RAIL EQUIP.	0.657708	0.636031
41 MOTOR VEHICLES	0.508526	0.191837
42 OTH. TRANS. EQUIPMENT	0.602826	0.217824
43 COMM. & ELE. EQUIP.	0.832604	0.815365
44 WATCHES & CLOCKS	0.506916	0.515307
46 OTHER MFG.	0.706299	0.378725



Table : 7

**Fuel Input Coefficients and Fuel Intensity Coefficients  
of Select Manufacturing Sectors: 1983-84**

Sector	Fuel Input Coefficients		Ratio of Fuel to Non-Fuel Inputs (Fuel Intensity)	
	Census	Non-Census	Census	Non-Census
SUGAR	0.0160	-	2.2484	-
KHANDASARI & BOORA	0.0540	0.0616	8.0553	9.1943
OTH. FOOD & BEV.	0.0076	0.0167	3.0056	2.2341
COTTON TEXTILES	0.0438	0.0699	8.5623	11.6594
SILK TEXTILES	0.0164	0.0130	2.5727	1.4715
ART SILK & SYN. FIB. TEX.	0.0287	0.0238	3.7435	10.3759
OTHER TEXTILES	0.0227	0.0205	3.7416	2.7011
WOOD BASED IND.	0.0544	0.3301	12.2726	102.8171
PAPER & PAPER BASED PROD.	0.1720	0.0235	38.7202	3.2088
LEATHER & LEATHR PROD.	0.0120	0.0093	11.6644	0.1696
RUBBER PROD.	0.0166	0.0322	16.8266	5.6264
PLASTIC PROD.	0.0855	0.0136	63.2535	1.6803
PETROLEUM PROD.	-	0.4640	-	364.4349
COAL TAR PROD.	0.1145	-	61.7709	-
FERT & PESTICIDES	0.1350	0.0011	18.0603	0.1577
AGAR BATTI ETC	0.0078	0.0063	12.4821	0.7913
SYNTHETIC FIB. & RESINS	0.0749	0.0121	19.1977	1.5756
OTHER CHEM.	0.0422	0.0400	24.6711	5.8331
CEMENT	0.0956	-	18.7226	-
OTH. NON-METAL PROD.	0.2912	0.0857	86.8146	16.1217
IRON & STEEL	0.1817	0.0757	29.3174	8.6394
NON-FERROUS METALS	0.1651	0.0400	470.8044	21.7435
HAND TOOLS	0.0317	0.0032	7.0980	0.8703



Table : (td...)

Sector	Fuel Input Coefficients		Ratio of Fuel to Non-Fuel Inputs (Fuel Intensity)	
	Census	Non-Census	Census	Non-Census
OTH. METAL PROD.	0.0227	0.0182	3.6217	3.3446
EARTH MOV. MACH.	0.0279	0.0044	8.0631	1.8327
MACHINE TOOLS	0.0724	0.0612	10.5332	1.9464
NON-ELE. MACHI.	0.0505	0.0280	11.1009	5.8644
ELEC. MACHINES	0.0268	0.0290	5.7923	4.3173
RAIL EQUIP.	0.0695	0.0915	25.5035	33.6070
MOTOR VEHICLES	0.0341	0.0126	7.4758	1.5847
OTH. TRANS. EQUIP.	-	0.0453	-	6.1611
COMM. & ELE. EQUIP.	0.0041	0.0001	2.4678	0.0509
WATCHES & CLOCKS	0.0075	0.0150	1.5215	3.2011
COSTUME & JEWELLERY	-	0.5501	-	222.1282
OTHER. MFG.	0.0084	0.0197	2.8782	3.2823
ELECTRICITY	0.1994	-	46.6162	-



Table : 8

Direct &amp; Indirect Fuel content per unit of Final Demand

	FORESTRY	PETROLEUM	COAL, TAR	ELECTRICITY	TOTAL
1 PADDY	0.001843684	0.047144704	0.001765516	0.017610566	0.068364502
2 WHEAT	0.002736282	0.061317827	0.002383408	0.002244556	0.146711975
3 OTHER CEREALS	0.002180179	0.047997039	0.001992601	0.016162951	0.068332772
4 PULSES	0.001083699	0.030244759	0.001138421	0.013440129	0.045907000
5 FIBRE CROPS	0.001284637	0.031438992	0.001205902	0.018276114	0.057205646
6 TEA & COFFEE PLANTS	0.00176954	0.014663011	0.000918311	0.008349194	0.025700056
7 OTHER CROPS	0.000790408	0.020041824	0.000750483	0.008049525	0.029632241
8 ANIMAL HUSBANDRY	0.001309873	0.015351735	0.000916201	0.007432107	0.025009917
9 FORESTRY	1.002805016	0.011518202	0.000690437	0.005701607	2.020795262
10 FISHING	0.000956291	0.023519573	0.000728602	0.004195831	0.029409298
11 MINING	0.001202449	0.044787910	0.001528232	0.038540089	0.086064682
12 SUGAR	0.005119359	0.027204292	0.001659583	0.017840493	0.051031729
13 KHANDASARI & MOORA	0.014046600	0.036058980	0.001520761	0.048098559	0.100524919
14 OTH. FOOD & BEV.	0.002851386	0.021265901	0.000941705	0.013792844	0.038851837
15 COTTON TEXTILES	0.007664365	0.051914945	0.007675901	0.064952054	0.132207266
16 SILK TEXTILES	0.007560862	0.028497935	0.001014575	0.024952802	0.062834176
17 ART SILK & SYN. FIB. TEX.	0.007332092	0.037160556	0.004380678	0.067640946	0.116521373
18 OTHER TEXTILES	0.010603180	0.047730941	0.004166276	0.049113467	0.111692973
19 WOOD BASED IND.	0.237044482	0.052351892	0.002334073	0.037600730	0.329331979
20 PAPER & PAPER BASED IND.	0.101114059	0.071794029	0.003553327	0.068662405	0.245123021
21 LEATHER & LEATHER PROD.	0.006506381	0.034305564	0.002474532	0.023624321	0.066920799
22 RUBBER PRODUCTS	0.001720306	0.020730655	0.001340221	0.018877604	0.042676780
23 PLASTIC PROD.	0.002803452	0.044997605	0.002572898	0.093001850	0.143375806
24 PETROLEUM PROD.	0.005130694	1.307648630	0.033918580	0.018647240	1.365323145
25 COAL TAR PROD.	0.006572357	0.074238062	1.063566642	0.013900185	1.158358047
26 FERT & PESTICIDES	0.01164486	0.107766632	0.005965307	0.063012458	0.187980805
27 AGAR BATHI ETC.,	0.003572202	0.014039525	0.001766397	0.006968292	0.027146417
28 SYNTHETIC FIB. & RESINS	0.003027736	0.021951871	0.003469625	0.118259249	0.146700402
29 OTHER CHEM.	0.009911052	0.047377780	0.016523708	0.026632725	0.100445267
30 CEMENT	0.003310143	0.053651330	0.002195827	0.116738723	0.175096024
31 OTH. NON-METAL PROD.	0.062380176	0.118500298	0.000444026	0.051562506	0.240887097
32 IRON & STEEL	0.019372263	0.205474379	0.006709083	0.192245492	0.423801219
33 NON-FERROUS METALS	0.001100927	0.053210406	0.002071642	0.094600045	0.151142920
34 HAND TOOLS	0.005531074	0.054217090	0.002005212	0.050470936	0.119904413
35 OTH. FIBER PROD.	0.010066950	0.074140174	0.002019000	0.001711410	0.177659017
36 FIBER PROD. MACH.	0.004056101	0.034224779	0.001250510	0.027410635	0.066950029
37 MACHINERY TOOLS	0.016330646	0.130609979	0.005335389	0.110124554	0.270608560
38 NON-ELEC. MACH.	0.010620943	0.092427770	0.003562704	0.077453845	0.104065272
39 ELEC. MACHINES	0.007773103	0.093748202	0.003613064	0.068746210	0.173800588
40 RAIL EQUIP.	0.024467028	0.080893377	0.014447619	0.053641644	0.173449670
41 MOTOR VEHICLES	0.011043865	0.087593294	0.003468178	0.075106841	0.177292180
42 OTH. TRANS. EQUIPMENT	0.019260599	0.131786890	0.005214433	0.094492722	0.250754646
43 COMM. & ELE. EQUIP.	0.003040156	0.017236703	0.000709052	0.018265763	0.039260475
44 WATCHES & CLOCKS	0.009963537	0.044444273	0.002544810	0.040261602	0.097214232
45 COSTUME & JEWELLERY	0.524486300	0.043005072	0.002147482	0.072458021	0.642097757
46 OTHER. MFG.	0.018330852	0.068202437	0.003137428	0.060395405	0.150066125
47 ELECTRICITY	0.005572100	0.003240298	0.003700403	1.200970738	1.293499541
48 CONSTN.	0.03201605	0.067814378	0.014943380	0.042625007	0.157398816
49 TRANS. SERVICES	0.005136079	0.207529431	0.007039601	0.035669732	0.255374845
50 COMMUNICATION	0.002722062	0.028475985	0.001165417	0.013982405	0.046346749
51 OTHER SERVICES	0.004642780	0.018640607	0.001879315	0.012524042	0.037606745



Table 1.9  
DIRECT LINKAGE COEFFICIENTS

	BACKWARD	FORWARD
1 PADDY	0.285996	0.074607
2 WHEAT	0.414825	1.277326
3 OTHER CEREALS	0.276311	0.073688
4 PULSES	0.223134	0.523530
5 FIBRE CROPS	0.235325	0.047062
6 TEA & COFFEE PLANTS	0.253693	0.361385
7 OTHER CROPS	0.196749	0.257550
8 ANIMAL HUSBANDRY	0.501200	1.220542
9 FORESTRY	0.100011	0.701155
10 FISHING	0.075700	0.504130
11 MINING	0.150398	1.479762
12 SUGAR	0.726120	0.050437
13 KHANDASARI & BOORA	0.725542	0.245010
14 OTH. FOOD & DEV.	0.362227	0.092997
15 COTTON TEXTILES	0.505708	0.103060
16 SILK TEXTILES	0.778576	0.364593
17 ART SILK & SYN. FIB. TEX.	0.632579	0.735066
18 OTHER TEXTILES	0.656402	1.541042
19 WOOD BASED IND.	0.593321	1.097943
20 PAPER & PAPER BASED IND.	0.651136	0.579620
21 LEATHER & LEATHER PROD.	0.806475	0.354839
22 RUBBER PRODUCTS	0.202320	0.144429
23 PLASTIC PROD.	0.493769	0.702520
24 PETROLEUM PROD.	0.591344	579.694060
25 COAL TAR PROD.	0.299921	02.560165
26 FERT & PESTICIDES	0.005992	9.681607
27 AGAR BATTI ETC.,	0.150468	0.003933
28 SYNTHETIC FIB. & RESINS	0.480047	1.423261
29 OTHER CHEM.	0.425347	2.701926
30 CEMENT	0.606770	2.802930
31 OTH. NON-METAL PROD.	0.620293	0.047415
32 IRON & STEEL	0.021545	2.304052
33 NON-FERROUS METALS	0.211923	0.940336
34 HAND TOOLS	0.406769	0.209498
35 OTH. METAL PROD.	0.507539	0.540918
36 EARTH MOV. MACH.	0.209647	0.100968
37 MACHINE TOOLS	0.815603	0.041264
38 NON-ELEC. MACH.	0.506317	0.474747
39 ELEC. MACHINES	0.624501	0.306719
40 RAIL EQUIP.	0.350743	0.521409
41 MOTOR VEHICLES	0.657329	0.149573
42 OTH. TRANS. EQUIPMENT	0.771607	0.463802
43 COMM. & ELE. EQUIP.	0.170367	0.009027
44 WATCHES & CLOCKS	0.407430	0.074540
45 COSTUME & JEWELLERY	0.797870	6.491730
46 OTHER. NEG.	0.610791	0.561207
47 ELECTRICITY	0.427805	3.131941
48 CONSTN.	0.640400	0.106421
49 TRANS. SERVICES	0.233326	0.639156
50 COMMUNICATION	0.123090	0.566566
51 OTHER SERVICES	0.307417	0.200336

FORMULAE : BACKWARD  
LINKAGE  
COEFFICIENT

TOTAL INTERMEDIATE  
INPUT OF SECTOR J  
-----  
TOTAL OUTPUT OF SECTOR J

FORWARD  
LINKAGE  
COEFFICIENT

TOTAL INTERMEDIATE  
DEMAND FOR OUTPUT OF SEC. J  
-----  
TOTAL DEMAND FOR SEC. J



TABLE :10 DIRECT + INDIRECT LINKAGE COEFFICIENTS OF KARNATAKA 1983-84

	FORWARD	BACKWARD
1 PADDY	0.504869063	0.771540148
2 WHEAT	0.625101447	0.919956655
3 OTHER CEREALS	0.561068360	0.796405159
4 PULSES	0.677893414	0.705739564
5 FIBRE CROPS	0.546421400	0.716305272
6 TEA & COFFEE PLANTS	0.551877941	0.800998529
7 OTHER CROPS	1.050357678	0.641412911
8 ANIMAL HUSBANDRY	1.357894215	0.925592416
9 FORESTRY	1.183040609	0.619213720
10 FISHING	0.541269544	0.612927049
11 MINING	1.181015085	0.659206310
12 SUGAR	0.535292678	1.040785781
13 KHANDASARI & BOORA	0.565907057	1.051867201
14 OTH. FOOD & BEV.	0.896032567	0.823180312
15 COTTON TEXTILES	1.126684964	1.110514096
16 SILK TEXTILES	0.818223364	1.443343260
17 ART SILK & SYN. FIB. TEX.	0.608552758	1.215656581
18 OTHER TEXTILES	0.934949275	1.257690352
19 WOOD BASED IND.	0.814931400	1.045366454
20 PAPER & PAPER BASED IND.	1.070152361	1.137021537
21 LEATHER & LEATHER PROD.	0.762634315	1.433997394
22 RUBBER PRODUCTS	0.604406031	0.691755468
23 PLASTIC PROD.	0.634899284	1.012321036
24 PETROLEUM PROD.	2.180235333	1.113510604
25 COAL TAR PROD.	0.665440126	0.778550414
26 FERT & PESTICIDES	0.950470662	1.320543954
27 AGAR BATTI ETC.,	0.530900028	0.661203197
28 SYNTHETIC FIB. & RESINS	1.123549242	0.989985233
29 OTHER CHEM.	2.630596565	0.918309319
30 CEMENT	0.663221184	1.044506191
31 OTH. NON-METAL PROD.	1.017431724	1.082726654
32 IRON & STEEL	3.756254068	1.568727826
33 NON-FERROUS METALS	1.470326417	0.714391505
34 HAND TOOLS	0.606091050	0.908243946
35 OTH. METAL PROD.	1.022789376	1.20015209
36 EARTH MOV. MACH.	0.501495925	0.842403204
37 MACHINE TOOLS	0.550471274	1.505772004
38 NON-ELEC. MACH.	1.507761925	1.174990062
39 ELEC. MACHINES	0.953797711	1.249669102
40 RAIL EQUIP.	0.639165434	0.917060331
41 MOTOR VEHICLES	0.617588912	1.206801398
42 OTH. TRANS. EQUIPMEN	0.701348503	1.527116120
43 COMM. & ELE. EQUIP.	0.546326817	0.702974213
44 WATCHES & CLOCKS	0.500816002	1.009153609
45 ELECTRONIC & TELECOMM.	0.600000000	1.100000000
46 OTHER. HCG.	0.722177252	1.197015001
47 ELECTRICITY	1.000660050	0.960361167
48 CONSTN.	1.550000021	1.140644959
49 TRANS. SERVICES	1.080700420	0.956944648
50 COMMUNICATION	0.865057991	0.640690506
51 OTHER SERVICES	2.024215690	0.794292785

FORMULAE: TOTAL LINKAGE  
EFFECT INDUCED BY SECTOR J =  $\frac{nc_j}{c..}$

TOTAL LINKAGE  
EFFECT RECEIVED IN SECTOR I =  $\frac{nc_i}{c..}$

where, n = number of sectors  
 $c = (I-A)^{-1}$

A = Matrix of input-output coefficients



TABLE : 11

## VALUE ADDED RATES

	KARNATAKA	NATIONAL
12 SUGAR	0.273872	0.173156
13 KHANDASARI & BOORA	0.271158	0.252074
14 OTH. FOOD & BEV.	0.677771	0.159613
15 COTTON TEXTILES	0.414212	0.345919
16 SILK TEXTILES	0.367421	0.116049
17 ART SILK & SYN. FI	0.343518	0.406352
18 OTHER TEXTILES	0.406679	0.240769
19 WOOD BASED IND.	0.348864	0.141770
20 PAPER & PAPER BASE	0.193525	0.286217
21 LEATHER & LEATHER	0.797672	0.199447
22 RUBBER PRODUCTS	0.556231	0.141730
23 PLASTIC PROD.	0.408656	0.157184
24 PETROLEUM PROD.	0.700079	0.145597
25 COAL TAR PROD.	0.199008	0.162695
26 FERT & PESTICIDES	0.518953	0.177444
28 SYNTHETIC FIB. & R	0.574653	0.158385
29 OTHER CHEM.	0.393222	0.202244
30 CEMENT	0.379707	0.251901
31 OTH. NON-METAL PRO	0.178455	0.166468
32 IRON & STEEL	3.788077	0.116675
33 NON-ELEC. MACH.	0.492683	0.247880
38 ELEC. MACHINES	0.375499	0.226818
39 RAIL EQUIP.	0.643257	0.206989
40 MOTOR VEHICLES	0.341671	0.151656
41 OTH. TRANS. EQUIPM	0.221313	0.165523
42 COMM. & ELE. EQUIP	0.821633	0.271716
43 OTHER. MFG.	0.381209	0.413571
46 ELECTRICITY	0.572195	0.181799

SIMILARITY

INDEX = 0.839119



	INTERMEDIATE USE	GROSS OUTPUT	FINAL DEMAND
PADDY	577299	7729600	7152301
WHEAT	646327	506090	-149327
OTHER CEREALS	474878	6444400	5969522
PULSES	940898	1812500	863602
FIBRE CROPS	79239	1683700	1604462
TEA & COFFEE PLANTS	445733	1233400	707667
OTHER CROPS	4638390	17892600	13284210
ANIMAL HUSBANDRY	3404335	2789200	-615135
FORESTRY	782947	1002295	219348
FISHING	288521	493933	205412
MINING	1255890	848711	-407179
SUGAR	112843	2237296	2124453
BIJANDASARI & POORA	27020	110279	83259
OTH. FOOD & BEV.	1277749	13739747	12461998
COTTON TEXTILES	699216	3819610	3120294
SILK TEXTILES	113514	311344	197330
ART SILK & SYN. FIB. TEX.	76858	104560	27702
OTHER TEXTILES	386181	258597	-135584
WOOD BASED IND.	1005372	915687	-89685
PAPER & PAPER BASED IND.	1515561	2614749	1099188
LEATHER & LEATHER PROD.	121834	343350	221516
RUBBER PRODUCTS	158279	1026657	878378
PLASTIC PROD.	196110	250613	54503
PETROLEUM PROD.	2544860	4390	-2540470
COAL TAR PROD.	209207	2534	-206673
FERT & PESTICIDES	1493255	154225	-1339020
AGAR BATTI ETC.,	8132	2067980	2059856
SYNTHETIC FIB. & RESINS	282500	198488	-84012
OTHER CHEM.	3825856	1415974	-2409082
CEMENT	882920	314998	-567922
OTH. NON-METAL PROD.	1903991	2246824	342832
IRON & STEEL	7104388	3083432	-4020956
NON-FERROUS METALS	3359188	3572329	213141
HAND TOOLS	149605	714108	564503
OTH. METAL PROD.	591662	1093812	502150
EARTH MOV. MACH.	129156	1279178	1150023
MACHINE TOOLS	40207	974384	934177
NON-ELEC. MACH.	1497268	3153823	1656555
ELEC. MACHINES	2549993	6593922	4043929
RAIL EQUIP.	216114	414480	198366
MOTOR VEHICLES	308121	2059997	1751876
OTH. TRANS. EQUIPMENT	146667	316227	160560
COMM. & ELE. EQUIP.	147018	16287118	16140100
WATCHES & CLOCKS	117142	1571523	1454381
COSTUME & JEWELLERY	37191	5729	-31462
OTHER. MFG.	892732	1590735	698002
ELECTRICITY	1705439	544010	-1161429
CONSTR.	2855292	15316393	12461101
TRANS. SERVICES	2215664	3466549	1250885
COMMUNICATION	504131	889801	385670
OTHER SERVICES	6388291	31887918	25499627

TOTAL

108002745



# MEDIUM TERM PERSPECTIVE FOR KARNATAKA AGRICULTURE

By

R.S. DESHPANDE

(Under the supervision of G. Thimmaiah)

## CHAPTER I: APPROACH

### 1.1. Introduction

The Green revolution has created three distinct regional groups based on their growth characteristics. The first group consists of the States which have taken advantage of the new seed - water - fertiliser technology and which did not experience any constraints, whatsoever, for development. These States have recorded impressive rates of growth in agriculture. The second group of States faced certain constraints (either inbuilt in the system or due to the lagged planning) and hence could not pick up the growth impetus. The third group includes those exceptions where growth could be achieved inspite of the prevailing constraints. Karnataka falls in this third group. Despite the low level of irrigation, (of less than 20 per cent of the area under irrigation), and vast areas which are drought prone, the State could record 2 to 3 per cent growth in the agricultural sector. Apart from the low irrigation and droughtproneness, the State has a typical crammed cropping pattern (with a host of heterogeneous crops) and a dominant tradition loving culture (which is supposed to be a bottleneck in the adoption of new technology). Judged against this background, the performance of the Karnataka economy has been commendable, though moderate.

The State, however, cannot be called as a self-sufficient State, especially in the food sector. It is one of the marginally deficit



tates. This situation gets aggravated in the drought years which is a frequent occurrence in the State. Recovery and restoration of economic forces devastated by drought at frequent intervals sets back the pace of development. A cumulative effect of such occurrences has been the persistence of inter-regional and intra-regional disparities. More than 35 per cent of the population of the State is below the poverty line. The struggle for these 35 per cent is not only to reach the adequate level of food consumption but also to adjust with what is available and to accommodate to such low level of food consumption. It is a matter of common knowledge that even within the remaining 65 per cent of the State's population which is above the poverty line only a certain portion of the population can afford diets which conform to the nutritional norms.

Self-sufficiency in foodgrains in a broader sense and removal (or reduction) of poverty in particular, justify the often repeated twin objectives of development, namely, growth with equity. First, it requires higher growth rates particularly in foodgrains output and secondly it is necessary to create food entitlement in order to make foodgrains accessible to the deprived sections. Both these objectives have to be pursued in Karnataka as priority objectives in framing the State food policy. Whereas the question of creating access to food is debatable and tresspasses into the domain of political economy, the future need of food is relatively straight forward and more technology-oriented. Any future projection of food needs will have to take into account the need to achieve "self-sufficiency" in foodgrains and ensuring adequate food as "minimum need" with the assumed level of technology.



Any study on forecasting is beset with unavoidable deficiencies and difficulties. This is more so in social sciences because human behaviour, natural factors, and technology are the three major determinants of any such forecasts and all the three are highly unpredictable. Hence, the basic framework of the forecasting (be it medium or long term forecast) depends on the assumptions and the reliability of the data used for these forecasts, and therefore would be dictated by the closeness of the assumptions to reality.

## 1.2. Background

Karnataka's performance in the field of economic development can be considered as above average, though, in relation to other States. In certain areas like industrial development, it is still lagging in spite of hoary beginnings in the field as far back as the 1960s. But the State has tremendous potential for development. As we have already noted earlier, it has recorded an impressive growth in agriculture in the post-green revolution phase despite the dominant constraints. Karnataka's development experience can be characterised as a case of arrested development with a great unexploited and under-exploited potential. Across the State, we find varied situations, i.e. from the irrigated agriculture of Mandya-Mysore districts to the chronic drought area of Bijapur-Gulbarga districts, and from the predominant forest-paddy regions of the hilly South and North Kanara districts to Ragi, jowar and cotton dominant Raichur, Tumkur and Kolar districts of the plains. The agro-climatic classification of the State divides the State into certain homogeneous regions, and the policy framework should take into consideration these differences.



Over the last three decades the State has undergone a structural change. This is quite obvious from the changes in the structural composition of the State income. We have presented in table 1.1, the changing structural composition of the State income. It may be noted that the share of agriculture in the State income is declining, which reflects a structural shift away from agriculture. It is also indicative of the increasing insulation of the overall State economy from the shocks of the agricultural sector. But this does not mean that the agricultural sector has witnessed low growth with high instability. In fact it is a case of high growth (relatively) even in the presence of high instability.

Table 1.1. Changes in the sectoral share of State income 1960 to 1985

Sector	Average of 5 years ending at				
	1964-65	1969-70	1975-76	1979-80	1984-85
1. Primary	56.79	52.96	52.51	48.30	44.58
2. Of which Agriculture	54.10	50.18	49.89	46.48	43.43
3. Secondary	21.98	24.34	24.67	27.70	36.25
4. Tertiary	21.23	22.70	22.82	24.00	19.17

Notes: Based on the State Income Series at 1970-71 prices. Five Years moving averages of the shares.

Further, it is interesting that the State has recorded an exponential growth rate<sup>1</sup> of 3.71 per cent per annum in the net State domestic product at 1970-71 prices during 1960-61 to 1985-86. During

<sup>1</sup> Growth rates here are based on trend fitting (Growth rates are presented in tables in the Appendix).



this period, the per capita income at constant prices increased by about 1.3 per cent per annum. We observed a structural change in the NSDP series at 1971-72 and noted that the growth rates prior to 1971-72 were slightly better than those obtaining after 1971-72. The growth performance of NSDP from the agricultural sector has not been that impressive. At constant prices (1970-71) the growth rate of SDP originating from agricultural sector was 1.53 per cent per annum. The agricultural sector recorded a declining growth trend in the post 1971-72 period, which is mainly due to the cluster of bad years at the end point (1985-86).

This performance, however, is not reflected in the growth of production and productivity of principal crops. We have presented the growth rates in production and productivity in principal crops in table 1.2. Maize, wheat, sugarcane, bajra and tur have recorded impressive growth rates. Among the crops the growth achieved in rice, wheat and sugarcane came mainly due to the availability of irrigation and new varieties of seeds. But the credit for growth in bajra, maize, ragi and cotton should go to the success of the new technology in rainfed agriculture. The coverage of area under high yielding varieties by 1984-85 was only about 24 per cent whereas only about 18 per cent of area is irrigated. The State's ultimate irrigation potential is about 54 lakh hectares and this would only be able to irrigate about 45 per cent of the gross cropped area and hence the dependence on rainfed crops is inevitable.

The growth rates in productivity also conform to the growth scenario of production of principal crops. Maize, wheat, jowar, bajra and cotton have recorded impressive rates of growth. The performance



of maize and wheat has been very impressive. Growth rates in productivity make it very clear that the growth rate of production in sugarcane is mainly due to area expansion. Groundnut, in particular, and oilseeds, in general, have shown a dismal performance which conforms to the all India pattern but growth rates in pulses are not that unimpressive.

These long term growth rates help us in forecasting the future supply projections. The Green revolution has made an impact on the trends in production via improvement in productivity. The structural breaks in the productivity series are quite noticeable in a majority of crops. (See figures depicting graphs of productivity of individual crops over the last three decades in the Appendix). It is interesting to note that there is no uniform year across crops at which the growth pattern has undergone changes. We may note here that rice, ragi, jowar, maize, pulses and oilseeds are the crops which depict very good growth potential apart from the low volume, high value crops like mulberry, potato or vegetables and the new crops like sunflower, soyabean, etc.

The foodgrain economy of the State is dependent on the decision making process of small and medium farmers. More than 3/4th of the area under food crops falls in the size group of holdings below 4 hectares<sup>2</sup>. The data from the agricultural census also indicate that the size of holding has a strong inverse relationship with the proportion of area allocated to food crops. Further, over the years,

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<sup>2</sup> Report on the Findings of Agricultural Census - 1960-61, State Agricultural Census Commissioner, Bangalore, 1981, p.51

<sup>3</sup> Op.cit., p.40



the size of holding has been declining and on an average it would reduce to 4 to 5 acres per household. This would bring in the forces of higher commercialisation. In such a situation we would be facing a shift away from food crops which is not necessarily unwelcome but has to be systematically planned, looking into the probable socio-economic implications.

Table 1.2. Growth rates in Production and Productivity  
of Principal Crops: 1955-56 to 1983-84

Sl. No.	Crops	(per cent per annum)	
		Production	Productivity
1.	Rice	2.54	1.96
2.	Ragi	2.18	1.83
3.	Jowar	1.80	3.49
4.	Bajra	4.53	3.18
5.	Maize	19.38	6.76
6.	Wheat	5.37	5.00
7.	Total cereals	2.60	3.21
8.	Minor millets	0.75	ne
9.	Tur	3.10	2.43
10.	Gram	ne	1.63
11.	Total pulses	2.32	2.00
12.	Total foodgrains	2.58	2.97
13.	Groundnut	0.17	0.37
14.	Sugarcane	4.85	0.45
15.	Cotton	2.93	3.33

Note: Growth rates are based on exponential trend.  
ne : Growth rates not estimated



The macro level data on cropping pattern indicates the shifting emphasis in the cropping pattern of the State. Table 1.3 presents the changes in cropping pattern in the last three decades<sup>4</sup>. The share of area under jowar, minor millets, total cereals, groundnut and

Table 1.3. Changes in cropping pattern of Karnataka State: 1955-85

Sl. No.	Crop	Average of Five Years ending at				
		1960	1966	1972	1980	1984
1.	Rice	9.14	10.42	10.69	10.11	10.35
2.	Ragi	9.30	10.36	9.64	10.06	10.13
3.	Jowar	26.06	27.82	22.41	17.84	18.94
4.	Bajra	4.99	4.71	5.08	6.39	5.45
5.	Maize	0.10	0.14	0.52	1.27	1.41
6.	Wheat	2.93	2.77	3.14	3.53	3.04
7.	Minor millets	4.67	4.08	4.60	4.34	3.28
8.	Total cereals	57.19	60.32	56.10	53.54	52.42
9.	Tur	2.78	2.81	2.73	2.95	3.27
10.	Total pulses	12.62	11.96	12.90	13.76	14.04
11.	Total foodgrains	69.81	72.29	69.00	67.23	66.46
12.	Groundnut	8.89	8.38	9.16	8.27	7.59
13.	Cotton	10.57	9.42	9.73	9.42	9.01
14.	Sugarcane	0.54	0.77	0.96	1.34	1.48

Note: The proportion of area under the crop to gross cropped area.  
Based on 5 years moving averages.

<sup>4</sup> We have taken five years moving averages to avoid year fluctuations



cotton has been decreasing over the last three decades. Similar is the case of total foodgrains as a crop group. On the otherhand, the area share of rice, ragi, maize, pulses (as a group) and sugarcane (a high value and low volume crop) has increased over the years. These varying trends have to be properly compensated by the productivity trends. Incremental productivity is one of the criteria for the decision relating to the allocation of area for different crops. But in the case of a few crops the productivity does not show an increasing trend so as to compensate the loss in production due to reduction in the share in the area allocated. Hence, more emphasis will have to be given to the crops which lag in productivity growth and at the same time have their area share declining.

The per capita availability of foodgrains is usually taken as a barometer to indicate the level of self-sufficiency which need not always be a right approach. The per capita availability also indicates the impact of the population pressure on the growth in production of foodgrains. In the absence of data on continuous series of inland movement (inter-state transactions) of foodgrains, we have used "per capita production" rather than "availability" to analyse the trend. The "availability" or "food balance" sheet data at the country level are also prone to difficulties in interpretation. The food production per capita in the State increased from 174 kgs per capita in 1960-61 to 192 kgs in 1964-65. After a decline in the following three years it again increased to 206 kgs in 1971-72. During 1975-76, it reached a

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5 See for details J.S. Sharma et al, "Two Analysis of Indian Foodgrain Production and Consumption Data", IFPRI, Research Report No.12, November 1979, p.48



6

peak of 218 kgs per capita and has been declining thereafter<sup>6</sup>. This indicates that in the later half of the seventies and early eighties, the foodgrain production could not keep pace with the growth in population. During this period the "foodgrains need" of the State could have been met from the supplies from other States and the central pool. Data from the Bulletin of Food Statistics indicate that in 1980, the supplies of foodgrains from the Central pool to the State was 3.63 lakh tonnes, which increased to 4.9 lakh tonnes in 1981. Of course, of these supplies, a major portion has gone to the roller flour mills and about 52 and 222 thousand tonnes to the State government and fair price shops<sup>7</sup>.

Net imports of foodgrains (from other States) into the State amounted to 318 thousand tonnes of cereals and 214 thousand tonnes of pulses during 1976-77<sup>8</sup>. The foregoing discussion suggests that the state will have to depend (though marginally) on other States and this is more so in the drought years.

This does not necessarily imply that the State should aim at total "self-sufficiency" in the sense of zero level of gross imports. In a federal system with a national market, no State can totally be "self-sufficient". Our contention is that the value of gross agricultural production of the state should be more than sufficient to meet the consumption needs. In terms of policy perspective, this would imply that the state could concentrate its efforts on low volume high

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See Figure 1.1, which shows the movement of per capita production.

<sup>6</sup> Bulletin of Food Statistics, Ministry of Agriculture, Govt. of India, New Delhi

<sup>7</sup> These data were not available beyond 1976-77.



value crops in the place of low productivity, low value crops. Such policy may increase the imports of foodgrains but the value of imports would be negligible.

### 3. Objectives and Focus

The main objective of the present study is to project the demand for agricultural commodities for a medium term perspective plan for Karnataka and to analyse the implications of such projected demand. The importance of the knowledge of future demand for agricultural commodities in any perspective plan needs no emphasis. It is not only important for fixing the priorities in the sectoral plan but also because of its strong forward and backward linkages with other sectors. It assumes importance in planning for other sectors. The specific objectives of the present study are:

- 1) to estimate future demand for major agricultural commodities based on three approaches, namely, (i) minimum nutritional needs, (ii) per capita availability and consumption in the past, (iii) consumer demand pattern.
- 2) to estimate the supply of these commodities on the basis of past trends with the given constraints on resources.

Consumer demand analysis has been a very well developed area of study in the broader discipline of economics and a number of studies are available on different aspects of this subject. We do not intend here to give any review of the studies conducted in this field.

9. Four elaborate reviews on consumer behaviour are available in the literature:

- i) N S Iyengar and N Bhattacharya (eds); A Survey of Research in Economics Vol.7, ICSSR, 1978.
- ii) Alan Brown and Angus Deaton, "Surveys in Applied Economics: Models of Consumer Behaviour", The Economic Journal, December 1972.
- iii) Robert E Evenson, "Food Consumption, Nutrient Intake and Agricultural Productivity in India", US AID, Oct.1986
- iv) R Radhakrishna and G V S N Murthy and Nireesh Shah, Models of Consumer Behaviour for Indian Economy, Sardar Patel Institute of Economic and Social Research, Ahmedabad, 1979.



of the studies, however, deal with the data at the country level; few of the studies have attempted future projections of the demand for agricultural commodities - NCAER (1962), National Commission on Agriculture (1976), Second India Studies - Food (1975), Agriculture Towards 200 A.D., FAO (1981), Towards New Horizons in Agricultural Production: 2000 A.D., - Shah and Sawant (1982). The studies dealing with the projections of demand at State level are not many. This is mainly because of the difficulties about the data and also the weakening of the assumptions at the disaggregated level. For Karnataka the latest study available was conducted at the Institute for Social and Economic Change <sup>10</sup>. This study deals with the short term projections of demand and supply of foodgrains for Karnataka. The present study is somewhat on similar lines with the updated data set.

The focus of the present study is more on what will be the requirements of some agricultural commodities (attention is more on the food sector) and the supply possibilities to meet this demand. No economic forecasting can give exact forecasts except by fluke, and therefore, they will have to be given in the form of a range. This range, however, should be as narrow as possible in order to make it worthy of operational use. Further, methodology of forecasting itself is one of the most important components among the various assumptions of forecasts. It is difficult to frame assumptions about the future technology and it is almost impossible to guess about the interaction between society and technology.

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10. L S Venktaramanan and K V Govindaraju, Demand-Supply Estimations and Short-Term Projections for Foodgrains in Karnataka, ISEC, Bangalore, 1985, p.26



## Approaches

Like any study on forecasting, the present study also undertakes alternative paths of projections, each called as an approach. Each of these approaches has two sets of assumption and the second inherent ones. In the paragraphs below we illustrate the different approaches for demand and supply projections.

A-1: The total availability of foodgrains is calculated as production and imports net of exports. From this an allowance is made for seeds, feeds, (of livestock) and wastage. The remainder divided by the population of the relevant year gives the net availability of per capita foodgrains. The demand for foodgrains is computed using the availability of foodgrains by two methods. Firstly, the trend in the net availability is computed and assuming that this trend continues in future, the net availability of the later years is projected<sup>11</sup>. Secondly, taking the per capita net availability of any one year and the projected population, estimates are obtained for a point in time in future<sup>12</sup>. Care, however, should be taken to avoid non-normal year (year of extreme fluctuations) for projections. The inherent assumption here is that the growth rate in net availability of foodgrains would be the same.

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At times, suitable assumptions are made about the growth trends keeping in view the technology. The allowances about seed, feed and wastages are usually based on some primary level data. Cf. J S Sharma and Shyamal Roy: Foodgrain Production and Consumption Behaviour in India - 1960-77, IFPRI, 1979, p.48.

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L S Venkataramanan and K V Govindaraju, Op.cit p.26



that of the population. We have followed both the methods, though we have taken per capita production of foodgrains instead of net availability. This method is superior to taking per capita net availability, as it avoids assumptions about the seed, feed (of livestock) and wastage. The assumptions about seed, feed (of livestock) and wastage are usually of static nature, in terms of proportions and hence they do not, in any way, increase the rigour of the projections. No doubt, these proportions may also undergo changes but mostly in the long-run.

This approach gives the projections with the background that population growth itself exerts pressure on the growth of production and though it indicates availability, it assumes away access to foodgrains.

Apart from the forecasts based on the per capita production, we have also made use of the trends in average intake of foodstuffs data published by the National Institute of Nutrition.

A-2: Much of the arguments on the quantitative measurement of the poor have been about nutritional requirement. The measurement of absolute poverty required fixation of a minimum nutritional norm essential for physical existence. Though the minimum needs approach has been criticised as a 'cold blooded' approach for measurement of poverty, it has distinct advantages in arriving at future food needs. This approach is plagued with the multiplicity of estimates because the



nutritional requirements vary widely between 2100<sup>13</sup> kcal (by Sukhatme) to 2700 kcal (by Bardhan<sup>14</sup>). This reflects difficulty in obtaining point estimates. The problem is further complicated by the spread of these nutritional requirements over different food items and inter-personal and personal changes in caloric requirements (according to age, sex, type, class, regional and rural-urban differences).

We have made use of the following sets of minimum dietary requirements:

- (i) Food and Agriculture Organisation (FAO) - Monthly Bulletin of Agricultural Economics and Statistics, January 1973. This gives minimum dietary requirements in terms of quantity per person per day.
- (ii) Indian Council of Medical Research (ICMR) estimate of minimum dietary requirement per adult per day for moderate work, common for rural and urban areas. As quoted in Perspectives for Karnataka, Perspective Planning Commission, Government of Karnataka, January 1978.
- (iii) Sukhatme's minimum target of dietary requirement. Sukhatme, Feeding India's Growing Millions, Oxford University Publishing House, Bombay, 1965.
- (iv) Dietary requirement of per person per day in rural and urban areas for sedentary and heavy work given by Kadekodi in "The Cost of balanced Diet", Working Paper No. 1, Glasgow - Delhi - Oxford Project on Poverty, Unemployment, Distribution and Employment in India.

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P V Sukhatme, "The World Hunger and Future Needs in Food and Agricultural Supplies", Journal of the Royal Statistical Society, Vol. 64, 1961

14

P K Bardhan, "On the Minimum level of living and rural development", Indian Economic Review, Vol. 5, 1970





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P. V. Sukhatme, "The World Hunger and Future Needs in Food Supplies", Journal of the Royal Statistical Society, Vol. 124, 1961

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P. K. Bardhan, "On the Minimum level of living and rural poor", Indian Economic Review, Vol. 5, 1970

All of the above minimum requirements are based on the per person per day basis where the reference 'person' is an adult. This brings in the concept of adult unit which has also been discussed in the literature. In order to convert the total population into adult units (by standard adult units) we need the distribution of population by age groups. The required population projections relating to distribution of population by broad age groups are available from the ISEC study<sup>15</sup>. Given this distribution, we have taken children falling in the age group of upto 14 as half adult units and estimated the total number of adult units. These are spread over rural and urban areas in the same proportions as that of the total population, the assumption being that the age specific distribution of population is the same in rural and urban areas. The total number of adult units are spread into two groups falling under 'sedentary work' and 'heavy work' by using the share of agricultural workers (cultivators plus agricultural labourers) from 1981 census.

A-3: National Sample Survey data pertaining to 28th (October 1973 to June 1974) and 32nd (July 1977 to June 1978) rounds give data on quantity consumed of major foodgrains<sup>16</sup>. We have

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15. Population Projections for Karnataka - 1981-2001, by P. B. Kulkarni, Institute for Social and Economic Change, Bangalore, 1985, p.20
  16. 28th round gives data on 11 items namely 1) rice and products, 2) wheat and products, 3) jowar and products, 4) bajra and products, 5) maize and products, 6) ragi and products, 7) barley and products, 8) small millets and products, 9) total cereals, 10) gram and products, and 11) cereal substitutes whereas 32nd round gives quantity of consumption of 11 items namely 1) rice, 2) wheat, 3) jowar, 4) bajra, 5) maize, 6) barley, 7) small millets, 8) ragi, 9) total cereals, 10) gram, 11) cereal substitutes.



noted earlier in A-2 that the multiplicity of the normative dietary requirements make it difficult to project a narrow range of requirements. Different assumptions of population growth and also the working conditions extend this range of dietary requirements further. More than this it is always argued that inter-personal and intra-personal variations dominate the nutritional dietary intakes. Individuals can adjust their nutritional requirements to very low caloric levels<sup>17</sup>, given the fact that an average Indian is not very caloric conscious but would like to receive 'enough' and 'better' food. In the consumer's calculation the 'enough' and 'better' food is the one he would buy if his income increases and he shifts to the next bracket of income. In other words, the average consumer would be likely to adopt the consumption pattern in the immediately next income (expenditure) bracket if his income increases, ofcourse without calculating the caloric requirements. He would prefer to eat more of certain commodities and reduce the consumption of some other items. These scales of preferences will not be independent of the social practices or the environment there and hence the consumption patterns of the two (not so widely) different income classes would not vary substantially.

We have framed our third approach on the above arguments. The approach paper to the eighth plan delineated poverty lines for the year 1977-78 and 1983 at current prices for both urban and rural areas.

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17. P V Sukhatma, "On Measurement of Poverty", Economic and Political Weekly, Vol.16, No.32, 1981, pp.1318-1324

Year	Poverty line in (Rs.) at current Prices	
	Rural	Urban
1977-78	68	79
1983	108	130

It was noted that in the 32nd round, the rural poverty line coincides with the 10th expenditure class, i.e. Rs.70 to 80. Whereas for urban areas it falls within the expenditure group of Rs.80 to 100. Similarly, for the 38th round, the poverty line would be coinciding with the expenditure class of Rs.100 to 125 for rural areas and between Rs.125 to 150 for urban areas. The persons falling below such poverty line would endeavour to cross the poverty line and reach the class above this level provided their real income increases. They would opt for the consumption bracket just above their group or aim at a consumption basket well above their group. We have classified these two conditions as consumption required for reaching 'just above the poverty line' and 'well above the poverty line'. Assuming the consumption requirement in these groups in quantity terms as the minimum requirement, we have projected the demand using population projections. Another way of arriving at the estimates can be based on the average level of consumption below the poverty line and above the poverty line with the population projections falling in these groups.



We did not specifically follow this approach because we are interested more in the question of requirements with minimum needs for the total population of the State.

- A-4 The NSS data has stimulated a large number of studies on consumption patterns in India<sup>19</sup>. Most of the studies based on these data are based on the estimation of expenditure elasticities. The approaches can be basically classified into three groups according to their tools of analysis: (i) Engel Curves, (ii) Complete demand systems following quadratic utility function approach and (iii) Linear Expenditure System<sup>20</sup> approach. It is not intended here to review the studies on demand analysis. For the purpose of our study we intend to use Engel Curve analysis to estimate the future demand<sup>21</sup>.

19.

	1977-78		1983	
	Rural (Rs.)	Urban (Rs.)	Rural (Rs.)	Urban (Rs.)
a) Expenditure size-class indicating a group "just above poverty line"	80-100	100-150	125-150	150-200
b) Expenditure size class indicating a group "well above poverty line"	100-150	150-200	150-200	200-250

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For survey see - B M Mahajan, Econometrics of Consumer Behaviour in India with Articulation of Methods for Approximate Determination of Indifference Surfaces (Ph.D. Thesis, Poona University, 1972) and Tyengar, Bhattacharya (1978); Brown and Deaton (1972), Radhakrishna, Murthy and Shah (1979).

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Studies reviewing the relative advantages and shortcomings of different techniques are available in the review of literature of R. Radhakrishna, GVSN Murthy and N C Shah

Engels curve is the relationship between consumption of an individual item and the income of the consumer.

$$Y_i = F_i(X)$$

where  $Y$  is the expenditure on the commodity  $i$ , and  $X$  is the income. Total expenditure ( $E$ ) is taken as proxy for income since no difficulty is encountered in forming composite commodity<sup>22</sup>. Different functional forms ( $F$ ) of Engel Curves have been used in the literature, and methods are developed<sup>23</sup> to select the best form. FAO Bulletin Income Elasticities of Demand for agricultural products, published in 1972 deals elaborately with the choice of the functional form.

Keeping in view the available literature, the data and the dependability of final results, we have taken four forms of Engel Curves:

(a) The Linear Form:

$$Y_{ij} = \alpha_{ij} + \beta_{ij} X_j$$

where  $Y_{ij}$  = Expenditure on  $i$  item in  $J$  class  
 $X_j$  = Total consumption expenditure in  $J$  class  
 $\alpha_{ij}$  and  $\beta_{ij}$  are the co-efficients

This function satisfies the additivity criterion and it is computationally simple. The parameter  $\beta_{ij}$  gives directly the marginal propensity to consume. The income (expenditure) elasticity tends to unity as income increases. This form does not allow the saturation level, since, as income increases, consumption also increases.

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22. Prais and Houthakker (1955)

23

. Jain and Tendulkar (1973)



Hence, though we have got good fits with respect to this form, the projections obtained have very low reliability.

(b) The double logarithmic form:

This function is of the following form.

$$\log Y_{ij} = \alpha_i + \beta_j \log X_{ij} + \gamma_{ij}$$

Where,  $Y_{ij}$ ,  $X_{ij}$ , and  $\gamma_{ij}$  as in the earlier form.

The co-efficient gives the measure of expenditure elasticity which remains constant over a range of income. As income rises, the marginal propensity to consume increases, if the expenditure elasticity is greater than unity. The function implies that at the smallest income level some quantity of good is purchased. This functional form has shortcomings on two other counts, i.e., it does not satisfy additivity as well as saturation criteria. Even then this form is one of the most commonly used forms in literature <sup>24</sup>

(c) The Semi-Logarithmic form:

The functional form is:

$$Y_{ij} = \alpha_i + \beta_j \log X_{ij} + \gamma_{ij}$$

Where,  $Y_{ij}$ ,  $X_{ij}$ , and  $\gamma_{ij}$  as in the earlier form.

The elasticity of expenditure is inversely proportional to the level of consumption and the marginal propensity to consume is also inversely proportional to income (expenditure). This function has an interesting property that

the incomes (expenditure) are log-normally distributed. The semi-log function is widely used in demand analysis and its behaviour is quite satisfactory for most food items.

(d) The inverse form (hyperbolic):

The functional representation of this form is

$$Y_{ij} = \frac{X_{ij}}{a_{ij} + b_{ij} X_{ij}}$$

Y, X and as defined earlier.

The function has two important properties, namely a positive intercept on X axis and a saturation level of consumption. The elasticity declines as income (expenditure) increases and tends to zero as income (expenditure) tends to infinity. It satisfies the additivity criterion. The elasticities are usually lower than those obtained for the above three functions. Despite its economic properties of additivity, initial income level, decreasing elasticity and saturation level, it is seldom used.

Functional Forms, Marginal Propensity to consume (MPC) and Expenditure Elasticity ( )

	Functional form	MPC
a.	Linear	
b.	Double log	
c.	Semi log	
d.	Hyperbolic	

Thus, elasticities of expenditure are obtained for different functional forms. The expenditure elasticity can be transformed into income elasticity of demand with the help of



the equation.

$$CY = CE \cdot EY$$

Where  $CY$  = income (Y) elasticity of demand of a commodity (C)

$CE$  = expenditure (E) elasticity of the commodity (C)

$EY$  = the elasticity of total consumption expenditure (E) with respect to income.

We had assumed  $EY$  as 0.85 based on the results  
25  
obtained earlier

Using these results and projected income levels, we arrived at the estimated level of demand for foodgrains and other commodities.

The approach based on the Engel curves has its own limitations, especially with the availability of techniques like complete demand system models, like quadratic utility functions, LES, Almost Ideal Demand System (AIDS), Price Independent Generalised Linear (PIGL), Engel curves. Further like the multiplicity of minimum nutritional norms, there are numerous forms of Engel functions and the choice of a particular form for comparison becomes difficult. The Engel curve analysis also assumes insensitivity of consumer expenditure to price changes; invariance of income elasticities over time and price structure and changes in the income distribution.

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25. See L S Venkataramanan and R V Govindaraju (1985), p.16, and Perspectives for Karnataka - 1978 to 1988, Government of Karnataka, January 1978, p.8

The foregoing four approaches give a range of demand projections. As indicated earlier, it is difficult to give point projections of demand and our efforts would be to narrow down these ranges.

The supply forecasts would not only give the potentials of the agricultural sector but also help in narrowing down the range of demand projections. The supply projections in literature are based on four methods. Firstly, the supply projections are made on the basis of supply response models in some of the studies<sup>26</sup>. Here the response of area under major crops is ascertained to various price factors and other inputs. The supply response model gives area projections which are used to arrive at the future course of production. The difficulty with supply response approach is that the increase in area under crops is reaching a saturation point and the growth in production is mainly due to the productivity growth. Secondly, some of the studies make use of the production or productivity response curves to arrive at the production level. This approach assumes a particular technical relationship between input and output which is quite a strong assumption. Furthermore, the response curves worked out at macro level have serious aggregation biases. The third approach is based on linear programming exercises, where the objective function is to maximise the output given

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26. L S Venkataramanan and K V Govindaraju (1985)



the input constraints for the future<sup>27</sup>. This approach also<sup>28</sup> has aggregation as the main constraint<sup>29</sup>. The fifth and the most straight forward approach is to project on the basis of past trends in productivity. Given the limits of area under crops the production of crops can be easily obtained. At times the growth rates are stepped up in order to accommodate the changing technology<sup>30</sup>. This approach is more commonly used in the literature because of the flexibility of the underlying assumptions. We have used the fourth approach for the supply projections.

A-5: This approach involves projecting the supply of principal crops in the crop economy of the State. Our aim here is not only to project the level of production that would prevail in future but also to forecast the level of input availability. For both the purposes we have used the past trends to arrive at the supply possibilities. In this approach we have given two scenarios - the first one based on the assumption that the same growth trends would continue in future and the second, on the stepped up growth rates with an assumption of a further technological improvement.

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27. C H Shah and S D Sawant, Towards New Horizons in Agricultural Production - 2000 A.D., Oxford, IBH, New Delhi, 1982

28. Moreover, the inherent assumption in linear programming approach is again the unchanged technical relations between input and outputs.

29. C H Shah and S D Sawant (1982)

30. However, we shall make use of the supply projections given in the study by L S Venkataramanan and K V Govindaraju (1985) for the purpose of comparisons.

## Data and Limitations

The present study is based on the following data sets:

- (i) Area, production and productivity data for principal crops obtained from the Directorate of Economics and Statistics, Government of Karnataka.
- (ii) Population projections obtained from P M Kulkarni's study on 'Population Projections for Karnataka 1981-2001', Institute for Social and Economic Change, Nagarbhavi, Bangalore, 1985
- (iii) Land Utilisation data, irrigated area, fertiliser use, State income and per capita income data from the Directorate of Economics & Statistics, Govt. of Karnataka
- (iv) National Sample Survey data for 1973-74 (28th round), 1977-78 (32nd round) and 1983 (38th round).
- (v) Minimum Nutritional Needs collected from various studies.

The data sets thus collected have certain limitations. The productivity data are not separately available for irrigated and rainfed conditions for long periods to work out separate trends. Though the districtwise data are available, it is difficult to segregate between irrigated and unirrigated yields of the district. The future scenario is likely to be more affected by the trend the productivity of rainfed crops assumes. The population projections data are based on certain assumptions of which we have taken three scenarios namely (1) Low fertility with migration, (2) medium fertility with migration, and (3) Medium fertility with no migration. The migration rates till 1981 were not very alarming but no straight forward assumption can be made about the rates that would prevail in future. The food balance sheet data for agricultural commodities were not available for the post 1976-77 period. We could not get the estimates of the inland movement of food and hence could not arrive at a long-term series of net availability.



The NSS data have their own limitations of which the major  
31  
limitations are (i) the sampling errors are large as far as the  
State level estimates are concerned, (ii) there is an inherent bias in  
the design, (iii) the extent of major item like foodgrain is over  
reported and the degree of over estimation is larger in the upper  
expenditure groups. However, in the recent years the degree of over  
estimation is falling.

These limitations, however, do not affect the present exercise  
because we do not intend to give any kind of point forecasts. Since we  
are attempting to put forth a range of projections it will take care  
of the probable distortions due to the data problems.

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31. For details, see (i) A Vaidyanathan, "On the Validity of NSS  
Consumption Data", Economic and Political Weekly, No.3, January  
18, 1986, (ii) M H Suryanarayana and N S Iyengar, "On the  
Reliability of NSS Data", Economic and Political Weekly, Feb.8, '86

## CHAPTER II: DEMAND PROJECTIONS

There are three main components of any analysis of demand projections - namely population, income and technology. Each of these components undergoes changes over years and hence their own assumptions about growth. We have already discussed the approaches that would be followed for projecting demand. The four approaches can be further compressed into two broad groups - the first based on the assumption of a certain level of consumption which represents requirements, the second group analyses the consumer behaviour and given this behaviour, it tries to project the likely demand if one parameter (income) of such behaviour attains an assumed (projected) level.

### 2.1. Population Projections

We have made use of the population projections given in the ISEC study since these are based on the most realistic assumptions and therefore methodologically superior<sup>32</sup>. The study gives population projections with different assumptions about fertility (High, Medium and Low) and migrations. We have chosen two sets, one with low fertility with migration and the other with medium fertility with migration. It was noted that net migration was not of a very high order in the past and the projections are based on the past trends. These data were then disaggregated into rural and urban sectors. We also had the projected population by age groups which has been used to convert the total population into adult unit equivalents. The population projections used and the number of adult units are presented in tables 2.1 and 2.2.



Table 2.1: Population Projections: Karnataka

(in millions)

Year	Assumption I			Assumption II		
	Rural	Urban	Total	Rural	Urban	Total
1991	31.4	15.4	46.8	31.2	15.4	46.6
1996	33.2	18.0	51.2	32.8	17.7	50.5
2001	34.8	20.7	55.5	33.9	20.2	54.1

Notes: (1) Assumption I - Medium Fertility with migration  
Assumption II - Low Fertility with migration

(2) Calculations of Rural and Urban population were made by interpolation.

Source: P M Kulkarni, Population Projections for Karnataka 1981-2001  
Institute for Social and Economic Change, Bangalore 1985

Table 2.2: Number of Adult Units

(in millions)

Year	Assumption I			Assumption II		
	Rural	Urban	Total	Rural	Urban	Total
1991	25.9	12.8	38.7	25.9	12.8	38.7
2001	29.7	17.6	47.3	29.2	17.4	46.6

Notes: The computations of Adult Units are based on the projected age distribution of population (p.20 of population projections). The assumption for computation of adult unit is 0.50 adult unit upto the age of 14 years and one adult unit above that. (FAO, Income Elasticities of Demand for Agricultural Products, page 28).

## State Income

The projected level of state income at current and 1970-71 prices are presented in table 2.3. It may be noted that NSDP at

Table 2.3: Projections of State Income for 1991, 1995 and 2001 A.D.

Sl. No.	Variable	Growth rate 1960-61 to 1985-86 per cent per annum	Projected levels*		
			1991-92	1995-96	2000-01
1.	Net State Domestic Product at current prices	10.71	158,888	238,693	396,985
2.	Net State Domestic Product at 1970-71 Prices	3.71	36963.6	42761.8	51305.0
3.	SDP from agriculture at current prices	6.09	47366.1	60002.0	80637.7
4.	SDP from agriculture at constant prices	1.53	14075.6	14957.0	16136.8
5.	Per capita income at current prices	8.16	3395 (3260)	4662 (4461)	7153 (6604)
6.	Per Capita Income at constant prices	1.32	789 (758)	835 (799)	924 (853)

Notes: (1) Except for State domestic product from agriculture (at current and constant prices) all the growth rates are based on exponential time trend. Whereas for SDP from agriculture the growth rates are based on linear trend.

(2) All the growth rates are statistically significant at 5 per cent level of significance.

\*

(3) The SDP figures (both at current and constant prices) are in millions whereas the per capita income is in Rs. per person.

(4) Figures in brackets indicate the projected per capita income. Whereas those given as per capita income are computed on the basis of projected population with assumption I.



current prices has a growth rate of above 10 per cent per annum whereas the same at 1970-71 prices is 3.71 per cent per annum. In the macro perspectives for Karnataka prepared by the Perspective Planning Division of the Planning Department, a growth rate of 8.1 per cent per annum (at constant prices), for the period 1982-88, was assumed under the assumption of "feasible growth with moderate efforts"<sup>33</sup>. The per capita income at current and constant prices grew at the rate of 8.16 per cent per annum and 1.32 per cent per annum respectively. The projected level of per capita income at 2000-01 was Rs.6,604 (current prices) and Rs.853 was 1970-71 prices.

Our growth rates of state income were based on the time series data over 1960-61 to 1985-86. We have noted earlier that during these two and half decades the State income series has a distinct structural break at 1971-72 and hence the growth rates prior to this and beyond this year were expected to be different. Our contention was that the growth rates in the later phase of the time series must have tapered off (slowed down). But what we have noted from the segmental growth rates was that there was no substantial difference between the two phases and in the later phase the growth rates were slightly higher as compared to the pre-1971-72 period.

### Projections

A-1: We have noted in the Chapter-I that this approach is based on the per capita production trends in the crops. Since we have taken per capita production instead of net availability, no assumptions have to be resorted to for feed (livestock), seed and wastage.

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33. Macro Perspectives for Karnataka - 1977 to 1988, Perspective Planning Unit, Planning Department, January 1978.

Similarly, this also assumes zero net imports (inland movements). For the first set of projections we have taken the per capita production of 1979-80, since that was a normal agricultural year. A careful look at the production of foodgrains shows fluctuating trend. It was initially less than 4 million tonnes which reached a peak of 4.8 million tonnes during 1964-65 and subsequently dropped to the lowest level in sixties to 3.5 million tonnes. It was during 1968-69 that the foodgrain production reached a higher level of 5 million tonnes and steadily increased upto 7.3 million tonnes during 1977-78 with the two bad years of 1972-73 and 1976-77. After this it fluctuated in the close neighbourhood of 7 million tonnes. This led us to the choice of 1979-80 as a normal year. Since the per capita production of foodgrains was quite high during this year it was convenient for us to assume this as the basic requirement of production.

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Taking 1979-80 per capita production as requirement we have projected the requirements for 1991 and 2001. It may be recalled that this approach has an in-built assumption of matching the population growth rate. The total requirement of foodgrains would be the same as projected by population rate of growth. The projections are presented in table 2.4(a) and 2.4(b). It may be noted that the range for the foodgrains projection is 9.55 to 11.38 million tonnes. This is an easily feasible range sans the fluctuations that may come along with.

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34. L S Venkataramanan and K V Govindaraju's study also took this as base year.



The growth rate in per capita production of foodgrains was about 0.22 per cent per annum. This is what could be achieved over the population growth in the last three decades or so, with the assumption that similar growth path would also continue in future. We have projected the production of total foodgrains presented in table 2.5. Here we have taken three different bases for future projections. Since the year at the end of the series was markedly a low observation and hence was eliminated from the estimation of growth rates. The range of projections is from 7.72 million tonnes to 10.60 million tonnes.

Table 2.4(a): Projections of Requirements - Scenario - A1  
Population Projection - Assumption I  
(in million tonnes unless specified)

		Per capita requirement			1991			2001		
Sl. No.	Item	1979-80 base (kgs/person/year)	Rural	Urban	Total	Rural	Urban	Total		
1.	Rice	66	2.07	1.02	3.09	2.30	1.37	3.67		
2.	Ragi	42	1.32	0.65	1.97	1.46	0.87	2.33		
3.	Jowar	51	1.60	0.79	2.39	1.77	1.06	2.83		
4.	Bajra	7	0.22	0.11	0.33	0.24	0.14	0.38		
5.	Maize	10	0.31	0.15	0.46	0.35	0.21	0.56		
6.	Wheat	6	0.19	0.09	0.28	0.21	0.12	0.33		
7.	Total cereals	187	5.87	2.88	8.75	6.51	3.87	10.38		
8.	Tur	7	0.22	0.11	0.33	0.24	0.14	0.38		
9.	Total pulses	18	0.57	0.28	0.85	0.63	0.37	1.00		
10.	Total foodgrains	205	6.44	3.16	9.60	7.14	4.24	11.38		
11.	Groundnut	17	0.53	0.26	0.79	0.59	0.35	0.94		
12.	Sugar equivalent	25.7	0.80	0.40	1.20	0.90	0.53	1.43		
13.	Cotton	3	0.09	0.05	0.14	0.10	0.06	0.16		

Table 2.4(b): Projections of Requirements - Scenario - A  
Population Projection - Assumption II

(in million tonnes unless specified)

Sl. No.	Item	Per capita requirement 1979-80 base (kgs per person per year)	1991			2001		
			Rural	Urban	Total	Rural	Urban	Total
1.	Rice	66	2.06	1.02	3.08	2.24	1.33	3.57
2.	Ragi	42	1.31	0.65	1.96	1.42	0.85	2.27
3.	Jowar	51	1.59	0.79	2.38	1.73	1.03	2.76
4.	Bajra	7	0.21	0.11	0.32	0.24	0.14	0.38
5.	Maize	10	0.31	0.15	0.46	0.34	0.20	0.54
6.	Wheat	6	0.19	0.09	0.28	0.20	0.12	0.32
7.	Total cereals	187	5.83	2.88	8.71	6.34	3.78	10.12
8.	Tur	7	0.22	0.11	0.33	0.24	0.14	0.38
9.	Total pulses	18	0.56	0.28	0.84	0.61	0.36	0.97
10.	Total foodgrains	205	6.39	3.16	9.55	6.95	4.14	11.09
11.	Groundnut	17	0.53	0.26	0.79	0.58	0.34	0.92
12.	Sugar equivalent	25.7	0.80	0.40	1.20	0.87	0.52	1.39
13.	Cotton	3	0.09	0.05	0.14	0.10	0.06	0.16



Table 2.5: Projections based on per capita production

Year	Projected per capita production (kgs) foodgrains				Projected foodgrains production (million tonnes)		
	A	B	C		A	B	C
1991-92	165	188	178	(i)	7.72	8.80	8.33
				(ii)	7.69	8.76	8.29
1995-96	166	189	179	(i)	8.49	9.68	9.16
				(ii)	8.38	9.54	9.04
2000-01	168	191	181	(i)	9.32	10.60	10.05
				(ii)	9.09	10.33	9.79

Note: (i) A - With the per capita production of 1984-85 as base.  
 B - With the average of per capita production over 1960-61 to 1984-85 as base  
 C - With the last five years average as base

(ii) I - Medium Fertility with migration  
 II - Low Fertility with migration

The third set of projections in this approach comes from the data given by National Institute of Nutrition (NIN), Hyderabad. The News Bulletin of NIN has published a time series of five years data on the average intake of foodstuffs. We are actually interested in the trend in the intake so as to base the projections on such trend. However, no discernible smooth trend could be observed in the data set and therefore we had to obtain the projections on the basis of average intake of foodstuffs. The observation that there was no specific trend in the intakes of foodstuffs itself makes it clear that the consumption pattern does not vary much in the short run. The changes can only be observed in the long run. Our projections with the help of average intake data range between 9.26 million tonnes to 11.02 million tonnes.

A-2: In the first approach we have looked into the projections which were mainly based on the basis that the population growth exerts pressure on production process and this results in a rate of growth which may be in the neighbourhood of population growth. But at times this may not provide the minimum dietary requirements needed for the average person. Our definitions of poverty lines are based on the nutrition requirement and in the literature we find numerous poverty lines defined on multitudinous packages of minimum requirements. Of these packages, we have carefully chosen four normative dietary requirements. An important weakness of this approach is the assumption of homogeneity of the consumption habits both at inter-personal and intra-personal levels.

As indicated earlier, we have converted the population into adult units since the dietary requirements are usually given in terms of adult units. The estimates given by the Indian Council of Medical Research are used quite often in the literature. In these estimates the requirements are available for individual crops unlike the crop group requirements in other norms. Table 2.8 presents the projections based on the ICMR dietary requirements. The projections are given for the two years 1991 and 2001. The estimates could not be given separately for rural and urban areas. But it can be split into two groups. The estimates for foodgrains range between 7.84 million tonnes to 9.58 million tonnes. This is also a manageable task since the growth rate involved is slightly above 2 per cent per annum.

The projections by Sukhatme's and FAO norms are given in table 2.9. Both the norms give the projected demand much lower than what is depicted by the ICMR norm. The demand for foodgrains range between



6.64 million tonnes (which is even below the average of the last five years production) to 8.76 million tonnes. It may be noted here that both Sukhatme's and FAO estimates were in terms of 'grams of quantity consumed per day per person' whereas we have computed it on the basis of adult unit. This, however, is a debatable issue and a prerequisite for such debate would be the actual procedure followed in the studies to arrive at the minimum requirements. As an alternative, we have also estimated the projections for cereals, pulses, total foodgrains and sugar for the population (instead of for adult units). From the table 2.8, it is clear that the requirements for foodgrains would be in the range of 9.3 to 10.3 million tonnes.

The minimum dietary requirement differ according to sex, type of work, region, age, tastes, etc. It may be really difficult to comprehend the quantity and include each of these variables in the analysis here but to the extent possible we shall accomodate different variables affecting consumption. Kodekodi's paper gives minimum dietary requirement by types of workmen, rural and urban areas<sup>35</sup>. He classified the working conditions into two categories, viz., (i) sedentary work, (ii) heavy work. It is difficult to obtain the projections of population by type of work and hence we preferred the average of the two requirements as the minimum requirement in rural or urban areas.

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35. His estimation is based on the study, "Dietary Allowances for Indians, C Gopalan and B S Narasungarao, ICMR Special Report No.60, 1971

Table 2.6: Demand Projections based on the average intake of different foodstuffs (NIN)\*

(in million tonnes)

Sl. No.	Item	Medium Fertility with Migration			Low Fertility with Migration		
		1991	1996	2001	1991	1996	2001
1.	Rice	4.94	5.41	5.86	4.92	5.33	5.71
2.	Wheat	1.45	1.58	1.71	1.44	1.56	1.67
3.	Bajra	0.37	0.40	0.43	0.36	0.39	0.42
4.	Jowar	1.21	1.32	1.43	1.20	1.30	1.40
5.	Ragi	0.49	0.54	0.58	0.49	0.53	0.57
6.	Maize	0.24	0.27	0.28	0.24	0.26	0.28
7.	Total cereals	8.70	9.52	10.29	8.65	9.37	10.05
8.	Pulses	0.61	0.67	0.73	0.61	0.66	0.71
9.	Total foodgrains	9.31	10.19	11.02	9.26	10.03	10.76
10.	Other vegetables	0.99	1.09	1.18	0.99	1.07	1.15
11.	Leafy vegetables	0.22	0.24	0.26	0.21	0.23	0.25
12.	Milk	1.46	1.60	1.74	1.46	1.58	1.69
13.	Oil	0.18	0.19	0.21	0.18	0.19	0.21
14.	Sugar	0.19	0.21	0.23	0.19	0.21	0.22

Note: (1) We have not presented here figures separately for Rural and Urban Areas. These can be apportioned. The basic data however, are not available separately.

\*

(2) Source: Nutrition News, National Institute of Nutrition, Vol.7, No.2, March 1986, Hyderabad

(3) Based on average intakes of foodstuffs for the period 1975-1980.



Table 2.7: Minimum Dietary Requirements

(in gms per day)

Items	Sukhatme's minimum target*	FAO*	ICMR**	Kadekodi's Estimates*			
				Sedentry work		Heavy work	
				Rural	Urban	Rural	Urban
Rice	-	-	167	-	-	-	-
Wheat	-	-	23	-	-	-	-
Jowar	-	-	168	-	-	-	-
Ragi	-	-	104	-	-	-	-
Maize	-	-	2	-	-	-	-
Other cereals	-	-	11	-	-	-	-
Total cereals	403	395	475	312.0	316.1	417.6	420.7
Pulses & Products	104	75	80	64.6	65.0	69.6	69.9
Roots & Tubers	46	160	-	42.5	45.3	60.8	63.0
Fruits & vegetables	137	225	-	202.1	205.6	220.9	224.4
Oils & Fats	18	16	40	34.4	34.9	39.4	39.7
Meat, Fish & Eggs	26	63	-	49.0	50.0	49.0	50.0
Sugar & Jaggery	50	35	40	34.7	34.2	43.5	43.0
Milk	201	98	-	230.4	230.3	230.4	230.3
Groundnut	-	-	-	1.9	1.6	24.3	23.6

Notes: (1) \* Per person, \*\* per adult unit

(2) Kadekodi's paper gives estimates separately for vegetarian and non-vegetarian food.

- Sources: 1) P V Sukhatme, Feeding Indias Growing Millions, Asia Publishing House, Bombay, 1965.  
 2) Food and Agricultural Organisation, Monthly Bulletin of Agricultural Economics and Statistics, Jan.1973  
 3) P K Bardhan, 'On the Incidence of Poverty in Rural India of Sixties', EPW, Feb.1973  
 4) G Kadekodi, 'The Cost of Balanced Diet', Working paper, GDO project on poverty and Income Distribution in India.

Table 2.8: Demand Projections based on ICMR Norm

(in million tonnes)

Crops	I		II	
	1991	2001	1991	2001
Rice	2.36	2.88	2.36	2.84
Wheat	0.32	0.40	0.32	0.39
Jowar	2.37	2.90	2.37	2.86
Maize	0.28	0.34	0.28	0.34
Ragi	1.47	1.80	1.47	1.77
Other cereals	0.16	0.19	0.16	0.19
Total cereals	6.71	8.20	6.71	8.08
Pulses	1.13	1.38	1.13	1.36
Total foodgrains	7.84	9.58	7.84	9.44
Oils & fats	0.57	0.69	0.57	0.69
Sugar and jaggery	0.57	0.69	0.57	0.69

Note: Based on Adult Units

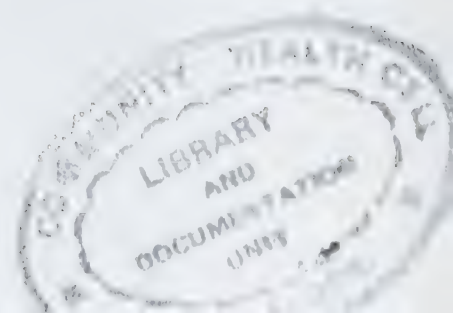




Table 2.9: Projected Normative Demand based on  
Sukhatme's and FAO Dietary Requirement

Crops	(in million tonnes)							
	Sukhatme's Norm				FAO Norm			
	I		II		I		II	
	1991	2001	1991	2001	1991	2001	1991	2001
Cereals	5.69	6.96	5.69	6.85	5.58	6.81	5.58	6.72
Pulses & Products	1.47	1.80	1.47	1.77	1.06	1.29	1.06	1.28
Roots and Tubers	0.65	0.79	0.65	0.78	2.26	2.76	2.26	2.72
Fruits & Vegetables	1.94	2.37	1.94	2.33	3.18	3.88	3.18	3.83
Oils & Fats	0.25	0.31	0.25	0.31	0.23	0.28	0.26	0.27
Meat, Fish & Eggs	0.37	0.45	0.37	0.44	0.89	1.09	0.89	1.07
Sugar & Jaggery	0.71	0.86	0.71	0.85	0.49	0.60	0.49	0.60
Milk	2.84	3.47	2.84	3.42	1.38	1.69	1.38	1.67

The projected estimates of demand are given in table 2.10. These estimates are also not that high. The demand for foodgrain ranges between 6.11 million tonnes and 7.45 million tonnes. All the normative requirements have given the projected demand for milk in the range of 1 to 2.5 million tonnes, whereas the requirements for oils and fats range between 2 lakh and 7 lakh tonnes which would require oilseeds production of about 7 lakh to 17 lakh tonnes. The lagging production would be that of pulses. Presently the total production of pulses hovers between 5 and 10 lakh tonnes. The minimum requirement norms of Sukhatme, FAO and ICMR put the projected demand in the range of 1.13 to 1.8 million tonnes, i.e., the growth rate in pulses production should be between 5 and 6 per cent to achieve this target. The breakthrough has to come via dry land technology.

Before we get on to the third approach we should make it clear that the minimum requirement projections were indicating only the consumption needs and not other uses such as seeds, animal feed and wastage. The growth rates in cattle and buffaloes were 0.5 and 1 per cent per annum respectively. This may help in projecting the demand for livestock feed. Sharma and Roy have used a constant figure of 12.5 per cent of gross production as allowance for seed feed and wastage<sup>36</sup>. If we take this as the basis, our estimates of requirements of total foodgrains would be:

Norm	Requirements by 2001 (million tonnes)	
	I	II
ICMR	10.95	10.79
Sukhatme's	10.01	9.85
FAO	9.26	9.14
Kadekodi's	8.54	8.43

36. J S Sharma and Shyamal Roy (1979), *Op.cit.*, p.48



Table 2.10: Demand Projections based on Kadekodi's Estimates of Norms

(in million tonnes)

Item	I				II			
	Rural		Urban		Rural		Urban	
	1991	2001	1991	2001	1991	2001	1991	2001
Total cereals	3.45	3.95	1.72	2.37	3.45	3.89	1.72	2.37
Pulses and products	0.63	0.72	0.31	0.43	0.63	0.72	0.31	0.43
Roots & Tubers	0.49	0.56	0.25	0.35	0.49	0.55	0.25	0.35
Fruits and vegetables	2.00	2.29	1.00	1.38	2.00	2.25	1.00	1.38
Oils & Fats	0.35	0.40	0.17	0.24	0.35	0.39	0.17	0.24
Meat, Fish and Eggs	0.46	0.53	0.23	0.32	0.46	0.52	0.23	0.32
Sugar, Jaggery	0.37	0.42	0.18	0.25	0.37	0.42	0.18	0.25
Milk	2.18	2.50	1.08	1.48	2.18	2.46	1.08	1.48
Groundnut	0.12	0.14	0.06	0.08	0.12	0.14	0.06	0.08

It may be noted that except ICMR(I) the rest of the scenarios would need growth rates of less than 3 per cent per annum over the next one and half decade

37

A-3: We have argued earlier that the nutritional norm gives one form of requirements, i.e., what should be consumed by the population. This, however, need not hold good in actual practice. Given an incremental income, a consumer would tend to buy the diet which is usually consumed by the next higher class in the same social environment. It is unreasonable to assume that the consumer would show preference to nutritional norm over the diet taken by the immediate next class. 28th and 32nd rounds of NSS give the data of quantity consumed by different income classes. For the purpose of our exercise here, we have chosen the data base provided by 32nd round coinciding with the year 1977-78.

Our approach is quite simple and we may put it below spread over three steps

38

1. The income class falling on the poverty line was identified. Here we have made use of the poverty line given in the Draft Eighth Plan of the state.
2. The consumption pattern (in terms of quantity) of the next two income classes was taken as representing "just above poverty line" and "well above poverty line" consumption patterns. The concept is nearer the "preference norm" rather than nutritive norm.

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37 The other method of arriving at demand for "other purposes" (seed, feed and wastage) would be adding about 1 percent rate of growth in the rates of growth of demand, which would give the estimate of the aggregate demand.

38

Our approach here is similar to that followed by V M Rao in Second India Studies on Food, See V M Rao (1975)



3. Assuming that the policy maker has to confront the poverty situation prevailing in 1977-78<sup>39</sup>, the estimates of demand were obtained for bringing these people to "just above poverty line" and "well above poverty line", i.e. making them available the diet taken by those falling in these two classes.

Here our assumption of constant poverty line (of 1977-78 estimate) over years is not very realistic atleast theoretically. We should have taken a declining trend in poverty (though actually there was no trend in the proportion of people below poverty line)<sup>40</sup>. An over-estimate of poverty problem is not as much harmful as taking lower estimates of poverty. Another limitation of this approach as well as the approaches explained earlier is the assumption of independence of income. Our focus in all the three approaches including this is not so much about changes in consumption pattern as a result of changes in income but on a more fundamental question of "what will be the requirement"?

Table 2.11 presents the per capita consumption of foodgrains for the three groups namely "just above poverty line", "well above poverty line" and "average of all expenditure classes", which serves as the basis for projections. The computed projections are presented in tables 2.12 to 2.15 with different assumptions of

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39. Planning Dept., "An Approach to Karnataka's Seventh Plan, 1985-90, Government of Karnataka, 1984

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. Trends were worked out on the data from G Thimmaiah's article on "Poverty in Karnataka: A Socio-Economic Profile", Margin, Vol.14(2) January 1982 (Table-1). It was noted that the linear trend values both in rural and urban areas are -0.76 and -0.24 both statistically not significant even at 10 per cent and hence can not be taken as indicative of declining trend.

population growth and for rural and urban areas. The tables also give the exact requirements of foodgrains to be allocated to bring the poor people "just above poverty line", and/or "well above the poverty line". The estimates of the demand of those who are already above the poverty line are also provided.

Table 2.11: Per Capita Consumption of Foodgrains by different classes  
(in kgs per month)

Sl. No.	Item	Rural			Urban		
		A	B	C	A	B	C
1.	Rice	6.69	8.76	4.40	8.30	9.05	5.76
2.	Wheat	0.60	0.79	0.47	2.00	2.44	1.40
3.	Jowar	6.04	5.34	6.23	1.86	1.13	2.80
4.	Bajra	0.11	0.22	0.31	0.01	-	0.03
5.	Maize	0.14	0.05	0.20	0.03	-	0.26
6.	Milletts	0.19	0.33	0.19	-	0.03	0.03
7.	Ragi	4.23	4.22	3.21	1.30	0.08	1.40
8.	Total cereals	18.00	19.71	15.01	13.50	13.61	12.68
9.	Gram	0.11	0.14	0.08	0.13	0.18	0.09
10.	Cereal substitutes	0.13	0.10	0.06	0.01	0.01	0.01
11.	Total Foodgrains*	18.24	19.95	15.15	13.64	13.80	12.78

Note: (1) A - Just Above Poverty Line; B - Well Above Poverty line; C - Average of all expenditure classes

(2) Data from NSS 32nd round.

(3) \* - Includes gram only out of pulses and not other pulses.

Source: Sarvekshna, Vol IX, No.3, Jan 1986



Table 2.12: Demand Projections of Foodgrains - 1991 Population - Assumption I  
(in million tonnes)

Item	RURAL						URBAN					
	Below poverty Line			Above Poverty Line			Below Poverty Line			Above Poverty Line		
	A		B	A		B	A		B	A		B
	Total		Total	Total		Total	Total		Total	Total		Total
1. Rice	1.81	2.38		0.93	2.74	3.31	0.99	1.07	0.60	1.59	1.67	
2. Wheat	0.16	0.21		0.08	0.24	0.29	0.24	0.29	0.16	0.40	0.45	
3. Jowar	1.64	1.45		0.56	2.20	2.01	0.22	0.13	0.07	0.29	0.20	
4. Bajra	0.03	0.06		0.02	0.05	0.08	0.002	-	-	0.002	-	
5. Maize	0.04	0.01		0.005	0.05	0.02	0.004	-	-	0.004	-	
6. Small Millets	0.05	0.09		0.03	0.08	0.12	-	0.004	0.002	0.002	0.006	
7. Ragi	1.15	1.14		0.45	1.60	1.59	0.15	0.009	0.005	0.155	0.014	
8. Total cereals	4.88	5.35		2.08	6.96	7.43	1.60	1.62	0.90	2.50	2.52	
9. Gram	0.03	0.04		0.01	0.04	0.05	0.02	0.02	0.01	0.03	0.03	
10. Cereal Substitutes	0.03	0.03		0.01	0.04	0.04	0.001	0.001	neg	0.001	0.001	
11. Total Foodgrains	4.94	5.42		2.11	7.05	7.53	1.62	1.64	0.91	2.53	2.55	

Notes: A - Demand for foodgrains for the population below poverty line to provide them diet of those who are just above poverty line.

B - Demand for foodgrains for the population below poverty line to provide them

Table 2.13: Demand Projections of Foodgrains - 1991  
Population Assumption - II

Item	(in million tonnes)									
	RURAL					URBAN				
	Below Poverty Line		Above Poverty Line		Total	Below Poverty Line		Above Poverty Line		Total
	A	B	A	B	A	B	A	B	A	B
1. Rice	1.81	2.37	0.91	2.72	3.28	0.99	1.07	0.60	1.59	1.67
2. Wheat	0.16	0.21	0.08	0.24	0.29	0.24	0.29	0.16	0.40	0.45
3. Jowar	1.63	1.44	0.56	0.91	2.00	0.22	0.13	0.07	0.29	0.20
4. Bajra	0.03	0.06	0.02	0.05	0.08	0.002	-	-	0.002	-
5. Millets	0.04	0.01	0.005	0.045	0.015	0.004	-	-	0.004	-
6. Small Millets	0.05	0.09	0.03	0.08	0.12	-	0.004	0.002	0.002	0.006
7. Ragi	1.14	1.14	0.44	1.58	1.58	0.15	0.009	0.005	0.155	0.014
8. Total cereals	4.86	5.32	2.06	6.92	7.38	1.60	1.62	0.90	2.50	2.52
9. Gram	0.03	0.04	0.01	0.04	0.05	0.02	0.02	0.01	0.03	0.03
10. Cereal Substitutes	0.04	0.03	0.01	0.05	0.04	0.001	0.001	neg	0.001	0.001
11. Total Foodgrains	4.92	5.39	2.08	7.00	7.47	1.62	1.64	0.91	2.53	2.55



Table 2.14: Demand Projections of Foodgrains - 2001  
Population Assumption - I

(in million tonnes)												
Item	RURAL						URBAN					
	Below Poverty Line		Above Poverty Line		Total		Below Poverty Line		Above Poverty Line		Total	
	A B		A B		A B		A B		A B		A B	
	A	B	A	B	A	B	A	B	A	B	A	B
1. Rice	2.02	2.64	1.02		3.04	3.66	1.31	1.43	0.81	2.12	2.24	
2. Wheat	0.18	0.24	0.09		0.27	0.33	0.32	0.39	0.22	0.54	0.61	
3. Jowar	1.82	1.61	0.62		2.44	2.23	0.29	0.13	0.10	0.39	0.28	
4. Bajra	0.03	0.07	0.03		0.06	0.10	0.002	-	-	0.002	-	
5. Maize	0.04	0.02	0.006		0.046	0.026	0.005	-	-	0.005	-	
6. Small Millets	0.06	0.10	0.04		0.10	0.14	-	0.005	0.003	0.003	0.008	
7. Ragi	1.27	1.27	0.49		1.76	1.76	0.21	0.01	0.007	0.217	0.017	
8. Total cereals	5.42	5.94	2.29		7.71	8.23	2.14	2.16	1.22	3.36	3.38	
9. Gram	0.03	0.04	0.02		0.05	0.06	0.02	0.03	0.02	0.04	0.05	
10. Cereal Substitutes	0.04	0.03	0.01		0.05	0.04	0.001	0.001	neg	0.001	0.001	
11. Total Foodgrains	5.49	6.00	2.32		7.81	8.32	2.16	2.19	1.24	3.40	3.43	

Table 2.15: Demand Projections of Foodgrains - 2001  
Population Assumption - II

(in million tonnes)										
Item	RURAL				URBAN					
	Below poverty Line		Above Poverty Line		Total		Below Poverty Line		Above Poverty Line	
	A	B	A	B	A	B	A	B	A	B
1. Rice	1.96	2.56	1.00	2.96	3.56	1.28	1.40	0.79	2.67	2.19
2. Wheat	0.18	0.23	0.09	0.27	0.32	0.31	0.38	0.21	0.52	0.59
3. Jowar	1.77	1.56	0.61	2.38	2.17	0.29	0.17	0.10	0.39	0.27
4. Bajra	0.03	0.06	0.03	0.06	0.09	0.001	-	-	0.001	-
5. Maize	0.04	0.01	0.006	0.046	0.016	0.004	-	-	0.004	-
6. Small Millets	0.06	0.10	0.04	0.10	0.14	-	0.005	0.003	0.003	0.008
7. Ragi	1.24	1.24	0.48	1.72	1.72	0.20	0.01	0.007	0.207	0.017
8. Total cereals	5.27	5.77	2.25	7.52	8.02	2.09	2.11	1.19	3.23	3.30
9. Gram	0.03	0.04	0.02	0.05	0.06	0.02	0.03	0.02	0.04	0.05
10. Cereal Substitutes	0.04	0.03	0.01	0.05	0.04	0.001	0.001	neg	0.001	0.002
11. Total Foodgrains	5.34	5.84	2.27	7.61	8.11	2.11	2.14	1.21	3.32	3.34



During 1991 the requirements of foodgrains range between 9.53 to 10.08 million tonnes of which the cereals constitute the major portion<sup>41</sup>. 32nd round does not give the data on quantity of pulses consumed (except gram). Our estimates of the requirement of foodgrains hence include cereals, cereal substitutes and gram only. The expenditure on pulses form about 6.5 per cent of the expenditure on food and about 4.0 per cent of the total expenditure in rural as well as in urban areas. This indicates that the estimates of foodgrains are slightly underestimated. The growth rates in order to achieve this target by 1991 would range from 6 to 7 per cent over crops which is a difficult task to achieve.

By 2001 A.D. the requirements range between 10.93 and 11.75 million tonnes. As between 1991 and 2001 the growth rates taper off drastically. In order to achieve the target by 2001 A.D., the growth rates needed would be about 3.3 to 3.6 per cent across crops with the base of 5 years average ending at 1984-85. With the objective of poverty removal by 2001 A.D. and the growth rate of about 3.6 per cent, the projected output of foodgrains by 1991 would be about 8.0 to 8.5 million tonnes. This seems to be a feasible target to achieve.

A-4: Numerous studies have employed Engel Curve analysis for projection of demand based on the NSS data. As indicated in Chapter-I, we have tried four different forms of Engel Curves,

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41. The requirements given here are only human consumption needs and allowances for seed, feed and wastages are not made.

namely, linear, semi-log, double-log and inverse. The best functional fit was chosen on the basis of high  $R^2$  obtained. Usually it is desired that the functional form satisfies certain economic criteria<sup>42</sup>, but none of the functions used in the literature satisfy all the economic criteria simultaneously<sup>43</sup>. The choice of the form of Engel function has therefore remained a matter of personal judgement. For the purpose of our analysis we have selected the functional form, (out of the four chosen a priori), which represents the data set in a fairly good manner. In other words, the function which we have chosen explains the maximum variation in the dependent variable<sup>44</sup>.

The advantage of Engel Curve analysis over the normative approaches described earlier is that it takes into account income (expenditure as proxy), an important determinant of consumption pattern. Moreover, this approach analyses the needs (or consumption behaviour) in the same socio-cultural settings unlike the dietary requirements which overlook this aspect. But this approach has its own limitations. We have discussed them while describing the approach in Chapter-I.

We have used the data from 32nd round coinciding with the year 1977-78 for the purpose of our projections since it gives detailed cropwise consumption pattern, unlike the 38th round. The expenditure elasticities thus obtained were converted into income

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42. FAO, 1972

43. Praise and Hanthakleer. 1971

44. Jain and Tendulkar's distance (1973) criterion was tried for two functional forms and the choice was the same as given by  $R^2$ .



elasticities of demand and are presented in table 2.16. Based on these estimates of income elasticities of demand, the growth rate in per capita income (1.32 per cent per annum) and the growth rates in projected population, we have obtained the growth rates in demand of each commodity. Given the base level demand of 1977-78, the projections were obtained for 1991 and 2001 A.D., for rural and urban areas with the two assumptions of population growth. The demand forecasts are presented in tables 2.17 and 2.18.

It may be noted that the projected demand ranges between 9.64 million tonnes (1991 with Assumption-II) to 12.35 million tonnes (2001 with Assumption-I) for cereals and between 1.10 and 1.41 million tonnes for pulses. The short run growth rates (upto 1991-2001) in cereals demand is 6.6 per cent per annum and about 10 per cent for pulses. But the long run growth rates in demand for cereals and pulses turn out to be about 4 and 5.7 per cent per annum for cereals and pulses respectively, with the "medium fertility with migration scenario" of population. The total foodgrains demand for two population assumptions ranges between 9.74 to 9.76 million tonnes in 1991-92 and 13.11 to 13.76 million tonnes during 2001-02. This would require a growth rate of 5.5 per cent initially to reduce to 4.3 per cent by 2001-02.

These estimates are slightly on higher side and it appears to be a tough target to achieve these rates of growth especially with the frequent interruption in production trend due to droughts in the vast rainfed area of the state. Moreover, the above estimates give only the human consumption needs and exclude about 12.5 per

cent allowances to be made for seed, feed (livestock feed) and wastage. This would put the demand estimates at a further higher scale.

Table 2.16: Estimates of Income Elasticities of Demand

Sl. No.	Item	Rural		Urban	
		Functional Form	D	Functional form	D
1.	Rice	Double log	1.0427	Semi Log	1.0474
2.	Wheat	"	0.9812	"	1.3505
3.	Jowar	Inverse	0.0779	Double log	1.5657
4.	Bajra	Double log	1.1340	Inverse	0.0313
5.	Maize	"	1.6071	"	0.0112
6.	Small millets	"	1.2917	Double log	1.8804
7.	Ragi	Semi log	0.7316	Inverse	0.1446
8.	Total cereals	"	1.0675	Semi log	0.8459
9.	Gram	"	1.8078	"	1.3324
10.	Pulses	Double log	0.8902	"	1.1182
11.	Edible oil	"	0.9500	Double log	2.1462
12.	Sugar	"	1.0305	Semi log	1.1513

Note: Based on 32nd round NSS data for 1977-78



Table 2.17: Projected Demand for Food Commodities  
Population Projections - I

(in million tonnes)

Sl. No.	Items	1991			2001		
		Rural	Urban	Total	Rural	Urban	Total
1.	Rice	1.97	1.60	3.57	2.40	2.31	4.71
2.	Wheat	0.21	0.35	0.56	0.25	0.52	0.77
3.	Jowar	2.34	0.73	3.07	2.55	1.12	3.67
4.	Bajra	0.12	0.006	0.126	0.13	0.008	0.138
5.	Maize	0.10	0.05	0.15	0.13	0.07	0.20
6.	Small Millets	0.09	0.009	0.0909	0.11	0.001	0.111
7.	Ragi	1.36	0.28	1.64	1.60	0.37	1.97
8.	Total Cereals	6.75	2.91	9.66	8.24	4.11	12.35
9.	Gram	0.04	0.02	0.06	0.05	0.03	0.08
10.	Pulses	-	-	1.10	-	-	1.41
11.	Total oilseeds	-	-	0.54	-	-	1.85
12.	Sugar Equivalent	-	-	2.04	-	-	2.70

Table 2.18: Projected Demand for Food Commodities  
Population Projections - II

(in million tonnes)

Sl. No.	Items	1991			2001		
		Rural	Urban	Total	Rural	Urban	Total
1.	Rice	1.96	1.60	3.56	2.33	2.25	4.58
2.	Wheat	0.21	0.35	0.56	0.24	0.51	0.75
3.	Jowar	2.33	0.73	3.06	2.47	1.08	3.55
4.	Bajra	0.12	0.006	0.13	0.13	0.007	0.14
5.	Maize	0.098	0.051	0.15	0.15	0.06	0.19
6.	Small Millets	0.09	0.0009	0.091	0.11	0.001	0.11
7.	Ragi	1.35	0.28	1.63	1.55	0.36	1.91
8.	Total Cereals	6.73	2.91	9.64	8.01	3.99	12.00
9.	Gram	0.04	0.023	0.06	0.05	0.03	0.08
10.	Pulses	-	-	1.10	-	-	1.41
11.	Total oilseeds	-	-	0.54	-	-	1.85
12.	Sugar Equivalent	-	-	2.04	-	-	2.70



We may now bring together the findings of the four approaches before analysing the supply situation. Any study on projections has to face the difficulty of multiplicity of estimates. This is mainly due to the host of assumptions involved in the process of estimation. Choosing the most reliable estimate out of the projected alternatives has more to do with the reliability of the assumptions. The higher the proximity of the assumptions to reality higher are the chances of keeping or retaining it. Keeping this in view we may review the estimates obtained thus far.

Our estimates, however, do not have large variations as between the approaches. As between the items we do not find any one approach having consistently extreme (low or high) estimates of demand. In other words, our estimates based on different approaches, though not very close to each other, by and large, tend to cluster around the same middle value. Table 2.19 gives such middle values, which could be fairly taken as representative of the future demand for the commodities. There are certain commodities which feature in all the approaches that we have analysed but on the other hand data limitations do not allow estimation of demand for certain other commodities.

In Table 2.19, we have given a consolidated picture of all the four approaches together. The ranges of estimates of demand are given commoditywise. For most of the commodities, the highest value of the estimation is 2 to 3 times larger than the lowest value of the range. In such cases the mean value of the estimates serve as the point at which different estimates cluster together. However, for policy

Table 2.19: Projected Demand for 2001 A.D:  
Most Probable Estimation of the Four Approaches

(in million tonnes)

Sl. No.	Item	Range of Estimates	Quantity
1.	Rice	2.88 -- 5.86	4.36
2.	Ragi	0.58 -- 2.33	1.73
3.	Jowar	1.43 -- 3.67	2.73
4.	Bajra	0.06 -- 0.43	0.25
5.	Maize	0.05 -- 0.56	0.29
6.	Wheat	0.33 -- 1.71	0.80
7.	Total cereals	6.32 -- 12.35	9.37
8.	Tur	--	0.38
9.	Gram	--	0.08
10.	Total pulses	0.73 -- 1.80	1.25
11.	Total foodgrains	7.47 -- 13.76	10.62
12.	Groundnut	--	0.58
13.	Oil and Fats	0.21 -- 0.69	0.46
14.	Sugar (equivalent)	0.23 -- 2.70	1.09
15.	Milk	1.74 -- 3.98	3.06
16.	Other cereals and substitutes	0.11 -- 0.19	0.15
17.	Vegetables	--	1.44

Note: (i) Ranges are not given for those items for which only one estimate is available.

(ii) The quantity demanded indicated here is the mean of the different estimates.

(iii) The projections above are for the 'medium fertility with migration' scenario.



purposes, it is better to keep in view the ranges of estimates rather than point estimates, especially in the situation like Karnataka where every 4th/5th year is a drought year. Drought not only causes production loss for that year but also sets back the process of development in the following year.

Now the question arises about the potential of the agricultural sector to meet the requirements estimated so far. It may be recalled that we have concentrated mainly on the consumption demand of agricultural commodities. The demand for the feed of livestock (fodder consumption) and fuel consumption have been estimated in a study by Madhav Gadgil and Madhulika Sinha<sup>45</sup>. They have put the fodder requirement 41.15 million tonnes and fuel demand of 11.2 million tonnes for 1984-85. Given the growth rate of about 1 per cent in the livestock, the fodder demand may increase to 48 million tonnes and about the fuel demand no realistic assumptions can be made because of the factors like alternative fuel sources, their availability and uses, the rate of deforestation and government policies. We have analysed the supply situation in the next Chapter.

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45. Madhav Gadgil and Madhulika Sinha, "The Biomass Budget of Karnataka", in Karnataka - State of Environment Report, 1984-85, (ed) Cecil J. Saldanha, Centre for Taxonomic Studies, Bangalore, 1986.

Unlike the multiplicity of estimation procedures and estimates in the analysis of demand projections, the projection exercises relating to supply are relatively simple. The challenge thrown by the demand estimates is not really a stupendous task (especially for 2001 A.D), to scare the policy makers. It is true that it is difficult to realise the 1991 demand since only about four years are there to achieve a quantum jump on the production front. Our demand scenario has indicated high initial rate of growth which will gradually slow-down to the neighbourhood of 3 per cent per annum. In the following paragraphs we shall look into the supply situations.

Broadly two types of approaches are followed in the projection studies of agricultural commodities. The studies which have used the first approach have applied the supply response models<sup>45</sup>. This basically involves capturing the response of area under the crops to various price, non-price, physical and resource factors. The second approach is relatively less dogmatic but nearer to more realistic

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45.

- i) S D Sawant
- ii) U K Pandey et al, "An Estimate of Demand for and Supply of Cereals, Coarse Grains, Pulses and Oilseeds in Haryana". Indian Journal of Agricultural Economics, January-March, 1984
- iii) L S Venkataramanan and R V Govindaraju (1985)
- iv) R S Deshpande and H Chandrashekar, "Growth and Supply Response of Slow Growth Crops - A Case of Pulses", Indian Journal of Agricultural Economics, July-September, 1982
- v) For a detailed review see Hossein, Askari and John Cummings, Agricultural Supply Response: A Survey of the Econometric Evidence, Praeger Publishers, New York, 1976



Here certain rates of growth are assumed keeping in view the past trends in inputs, related factors, the changes due to technology and the optimum level of achievable targets. Sometimes linear or recursive programming approach is followed with the objective function of optimisation of output, given the constraints on irrigated area, fertilisers, human labour, operating costs, etc.

We have opted for the approach based on the growth rates mainly because of the simplicity involved but because of three reasons. Firstly, the area response approach would not yield good results because the increase in the area (gross sown area) is not very significant over the last three decades. Over and again, it is stated that the strategy for the coming decades should be based more on the improvements in yield per hectare of the crops rather than an increase, since the area constraint is almost nearing its optimum level. Secondly, quite a few macro level studies have noted very low price response (relative or real) to the acreage under crops. Thirdly, the approach based on the programming methodology seems to over-estimate the supply of crops .

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46. i) National Commission on Agriculture, Report of the National Commission on Agriculture - Part III, Demand and Supply 1976.  
 ii) L S Venkataramanan and K V Govindaraju (1985)  
 iii) C H Shah and S D Sawant, Towards New Horizons in Agricultural Production 2000 AD, Oxford IBH, New Delhi, 1982  
 iv) Daya Singh and A S Kahlon, "Predicting Crop Production Haryana", Indian Journal of Agricultural Economics, January-March 1972

47 C H Shah and S D Sawant (1982), p.66

Our approach to supply projections involves basically the principle of the most probable growth rate. As a first step we estimated the growth rates for all the districts of the state for all major crops. Out of these we eliminated crop-wise those districts which do not have substantial area (relative to state) under the crop. This was achieved by computing location quotients for all the districts for the principal crops<sup>48</sup>. At this stage we were left with the growth rates of the crop only for the districts where the crop is well established. Two sets of growth rates were picked up crop-wise from this table, one at a moderate level indicating the most probable growth rate across the districts and the second at the highest among the districts for the concerned crop. Using these two sets of growth rates and the base level of productivity we have arrived at two sets of projections for the crops.

Cropping pattern is the most crucial determinant of any supply projections. In the first chapter we had seen the changes in the cropping pattern over the last 3 decades. Our projected cropping pattern is based on the table 1.3 giving five years moving averages. It was noted that proportion of area under food crops was going down slowly and especially so in the case of cereals. Hence the growth in production of these crops has to come more through improvement in productivity. Shah and Sawant's study gives the land potential under alternative scenario<sup>49</sup>. Taking this area as the total area available would have been an overestimate and hence we projected the gross cropped area with the estimated trend value assuming 1984-85 as base

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48. M V Nadkarni and R S Deshpande, "Rainfall and Yield Uncertainty in Karnataka Agriculture", Research Report, ISEC, 1979.

49. This is actually an over-estimate of the land. See C H Shah and S D Sawant (1982), p.100



year. The projected gross cropped area was allocated to the area under each crop in the same proportion as that given by the cropping pattern.

Table 3.1 gives the growth rates in input use for different inputs for the period 1955-56 to 1984-85. Over the entire period irrigation (especially under wells and canals), has recorded an impressive rate of growth. Fertiliser use per hectare as well as area under High Yielding varieties have recorded growth rates of the order of 8.8 and 10.8 per cent respectively. This brings forth the role of input growth in the new technology and its role in overall agricultural production.

Table 3.1: Growth in input use

Sl. No.	Variable	Growth rates in per cent per annum (1955-56 to 1984-85)
1.	Area irrigated under canals	4.22
2.	Area irrigated under tanks	-0.25
3.	Area irrigated under wells	5.01
4.	Net irrigated area	2.56
5.	Gross irrigated area	3.17
6.	Net sown area	0.043
7.	Gross sown area	0.25
8.	Cropping intensity	0.22
9.	Irrigation intensity	0.65
10.	Area under HYV	10.83*
11.	Fertiliser Consumption per hectare of net sown area	8.82*

Note: \*In the case of Fertiliser use the growth rate pertains to the period 1965-66 to 1984-85. And for HYB area the growth rate pertains to the period 1970-71 to 1984-85.

An important aspect of the structural changes in Karnataka is that the growth rates of some of the crops are quite sustainable.

In an alternative exercise we have also looked into the sub-period-wise growth rates of some of these variables. It was noted that during the later sub-period, i.e., starting with 1977-78 upto 1984-85 the growth rates of irrigation have slightly tapered off. But no definite signals of any deceleration were observed. The only thing that should be a reason for worry is the dismal growth in cropping and irrigation intensity. The growth rates in irrigation and cropping intensity are very low and are unlikely to improve even if corrections for annual crops are incorporated. It is true that the emphasis of the technology was more on input intensity (excluding land). But now the focus needs to be changed towards increasing the base as well. In other words, it is time that two or more crops are grown in the irrigated region at least. It is interesting to note that out of the total area cropped more than once, only 43 per cent was the area irrigated more than once, whereas the remaining 57 per cent double cropped area comes from the rainfed region<sup>50</sup>. Whether such a trend indicates the success of the rainfed technology or failure of irrigated agriculture is open to debate.

Turning to the growth performance we have estimated district-wise growth rates for the last 3 decades for the principal crops. These were computed only for the districts crop-wise with substantial

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50. Data pertaining to 1984-85 but the situation in any other year is not very different.



Table 3.2: Districtwise Growth rates in Productivity of Principal Crops  
1955-56 to 1983-84

(Per cent per annum)

Districts	Pice	Ragi	Total Jowar	Bajra	Maize	Wheat	Total cereals	Gram	Tur	Total pulses	Total food- grains	Ground- nut	Cotton	Sugar- cane
Bangalore	1.88	2.31	-	-	2.33	-	2.56	-	-	0.81	2.53	-	-	1.70
Belgaum	-	-	1.54	-0.73	6.07	4.15	2.32	1.62	1.49	1.74	2.24	-0.99	-	0.31
Bellary	-	-	4.11	3.48	8.60	-	3.96	-	-	3.74	4.03	1.17	4.55	0.24
Bidar	-	-	3.76	-	-	-	3.46	1.50	2.62	1.52	3.02	-0.21	-	-0.49
Bijapur	-	-	1.31	2.65	8.29	5.48	3.02	2.44	-	2.20	2.93	-0.47	0.50	-
Chitradurga	-	2.33	5.11	3.47	-	-	4.63	-	4.29	3.96	4.92	-	3.16	-
Kodagu	0.49	2.63	-	-	-	-	0.80	-	-	3.86	0.51	-	-	-
Chikmagalur	1.88	1.75	-	-	-	-	2.01	-	-	1.35	2.05	-	-	-
Utharwar	0.06	-	2.59	-	-	3.18	1.98	-	-	-	1.99	1.30	2.64	-
Gulbarga	-	-	3.17	3.50	-	4.64	2.56	1.88	1.02	2.44	2.88	0.82	-	-
Nassan	1.81	2.48	-	-	7.58	-	2.46	-	-	3.00	2.09	-	-	2.07
Kolar	0.92	0.16	-	-	6.64	-	1.14	-	-	0.98	1.01	1.01	-	1.37
Nandiya	2.81	3.74	-	-	9.27	-	3.66	-	-	0.21	3.31	-	-	0.12
Mysore	1.46	2.90	3.17	-	-	-	2.77	-	-	1.53	2.55	-	-	-
Uttara Kannada	1.19	1.22	-	-	-	-	0.88	-	-	0.25	1.20	-	-	2.49
Kailasur	-	-	2.80	4.39	-	5.55	4.13	3.73	2.75	3.01	4.21	1.00	4.73	-
Sulgaoya	1.77	3.86	-	-	-	-	2.59	-	-	1.01	2.86	-	-	1.40
Tumkur	3.54	0.59	-	-	-	-	1.80	-	-	2.19	1.60	1.44	-	-
Lakshina Kannada	1.86	1.56	-	-	-	-	1.90	-	-	4.20	3.34	-	-	0.32

Note: Growth rates are based on the best fitting trends from among linear and exponential forms.

(relatively) area under the crop . The results are presented in table 3.2. The choice of the district with relatively substantial area under the crop was necessary because in the districts where the area under a crop is very low, we are likely to get over estimates or under estimates of the growth rates (e.g., growth rate of 47 per cent for Ragi in Bijapur or 27 and 31 per cent for total jowar and bajra in Bangalore).

A quick look at the table 3.2 shows that among the crops, maize and wheat have recorded the highest rates of growth followed by bajra, jowar, cotton and ragi in that order. Rice and pulses (gram and tur) have experienced moderate rates of growth in the range of 1 to 3 per cent at times exceeding 3 per cent. The lowest order of growth rates were recorded by sugarcane and groundnut. It is not very surprising that some of the rainfed crops have recorded impressive rates of growth in the state. In order to compare the performance of crops across districts we have chosen the districts with highest and lowest growth rates crop-wise.

The following statement shows the districts which are leading in our crop economy and those which are lagging behind. However, care should be taken while reading the results of crop groups. Since we have not eliminated the districts with meagre area, districts like

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- However, for crop groups (like total cereals, pulses & foodgrains), we have presented the growth rates for all the districts.



Uttara Kannada or Kodagu appear in the group of districts with low rates of growth. Some of these districts have a largely diversified cropping system. Hence, their real performance could not be captured within the present framework. Secondly, there are crops which have either only 'high' rates of growth like maize and wheat or 'low' rates of growth like groundnut.

Statement showing the Relative Performance of Different Districts  
in Different Crops

Sl. No.	Crop	Districts with High Growth Rates	Districts with Low Growth Rates
1.	Rice	Tumkur, Mandya, Chickmagalur	Dharwad, Kodagu, Kolar
2.	Ragi	Shimoga, Mandya, Mysore	Kolar, Tumkur, Uttara Kannada
3.	Total jowar	Chitradurga, Bellary, Bidar	Bijapur, Belgaum, Bidar
4.	Bajra	Raichur, Gulbarga, Bellary	Belgaum, Bijapur
5.	Maize	Mandya, Bellary, Bijapur	Bangalore
6.	Wheat	Raichur, Bijapur, Gulbarga	---
7.	Total cereals	Chitradurga, Raichur, Bellary	Kodagu, Uttara Kannada, Kolar
8.	Gram	Raichur, Bijapur	Bidar, Belgaum
9.	Tur	Chitradurga, Raichur	Gulbarga, Belgaum
10.	Total pulses	Dakshina Kannada, Chitradurga, Kodagu	Mandya, U. Kannada, Bangalore
11.	Total food-grains	Chitradurga, Shimoga, Bellary	Kodagu, Kolar, Uttara Kannada
12.	Groundnut	Tumkur, Dharwad	Belgaum, Bijapur, Bidar
13.	Cotton	Raichur, Bellary, Chitradurga	Bijapur
14.	Sugarcane	Uttara Kannada, Hassan, Bangalore	Bidar, Mandya, Bellary

Out of these rates of growth, we have chosen two rates crop-wise - one indicating a "moderate level of growth" among districts or the most feasible rates of growth and the other 'highest achievable rate of growth'. Our choice of growth rates, though subjective to certain extent, has the basic principle of what can be achieved in the given situation. Since we are choosing out of a set of actually attained growth rates, these can be rated as the most feasible rates of growth and the situations under which these rates were achieved could be emulated for the other districts/regions after careful modelling.

Our supply scenarios are based on these crop-wise rates of growth and the projected crop-wise cropping pattern. There is a distinct advantage in selecting crop-wise rates of growth over a general overall rate of growth, because all the crops have not experienced the same growth potential as indicated by the general rate of growth. Some of the crops seem to have reached the saturation level of productivity, (maize, sugarcane), with the present varieties, whereas other crops would still have a long way to reach that level (groundnut, pulses, jowar, bajra, etc.). The assumed rates of growth and cropping pattern are given in table 3.3. Table 3.4 presents the projected supply of these crops, given these growth rates and cropping pattern.

The productivity levels with 'moderate' and 'high' rates of growth were checked with the data given in the booklets on 'Package of Practices for High Yields' issued by University of Agricultural Sciences. It was noted that except for maize and sugarcane (with high growth rates) the projected productivity level of all the other crops



Table 3.3: Assumptions for supply projections

Sl. No.	Crops	Selected Growth Rates (per cent per annum)		Cropping Pattern			
		Moderate	High	Share %	Area (lakh hect)	Share %	Area (lakh hect)
				1991		2001	
1.	Rice	1.8	3.5	10.75	12.73	11.07	13.42
2.	Ragi	2.5	3.8	10.31	12.21	10.52	12.76
3.	Total jowar	2.5	4.0	15.17	17.98	11.17	13.55
4.	Bajra	3.4	4.4	6.17	7.31	6.61	8.02
5.	Maize	3.0	9.3	1.82	2.16	2.44	2.95
6.	Wheat	4.0	5.5	3.41	4.04	3.58	4.34
7.	Total cereals	2.5	4.6	50.98	60.41	48.33	58.58
8.	Gram	1.5	3.7	3.24	3.83	3.41	4.14
9.	Tur	2.5	4.3	3.24	3.83	3.41	4.14
10.	Total pulses	2.5	4.2	14.46	17.14	15.21	18.44
11.	Total foodgrains	3.0	4.2	65.40	77.50	63.49	76.96
12.	Groundnut	1.0	1.4	7.66	9.07	7.23	8.76
13.	Cotton	2.0	4.7	8.71	10.32	8.22	9.96
14.	Sugarcane	1.0	2.5	1.45	1.72	1.85	2.24

were feasible. These productivity levels were lower than what is given by the "Package of Practices for High Yields". It is possible that for maize and sugarcane the growth rates in productivity may begin to decelerate and the only way of increasing production (for taking advantage of the high yielding capacity especially of maize) is to increase area under them.

The projected levels of production indicate foodgrains output of about 9.52 to 12.71 million tonnes with 'moderate' rates of growth and about 10.45 to 15.65 million tonnes with 'high' growth rates in 1991 and 2001 respectively. The major share of the foodgrains production is originating from rice, ragi and jowar. Pulses are expected to contribute about 1.2 to 1.6 million tonnes. Maize and wheat are the crops which have tremendous potential and favourable conditions for growth in the state. Special emphasis, is however, needed to boost the production of pulses and groundnut. In both the cases the production has to be twice that of the average of last five years.



Table 3.4(a) Supply Projections

Sl. No.	Crops	Projected Productivity Levels in kgs/hect.with		Projected level of production in million tonnes with	
		Moderate Growth Rates	High Growth rates	Moderate Growth rates	High Growth Rates
1.	Rice	2406	2747	3.06	3.50
2.	Ragi	1400	1621	1.79	1.98
3.	Total jowar	1023	1150	1.84	2.07
4.	Bajra	531	587	0.39	0.43
5.	Maize	3399	5465	0.73	1.18
6.	Wheat	855	959	0.35	0.39
7.	Total cereals	1372	1614	3.29	9.75
8.	Gram	524	622	0.20	0.24
9.	Tur	617	709	0.24	0.27
10.	Total pulses	468	534	0.80	0.92
11.	Total foodgrains	1229	1348	9.52 (9.09)Æ	10.45 (10.67)Æ
12.	Groundnut	799	825	0.73	0.75
13.	Cotton	138	170	0.14	0.18
14.	Sugarcane	86*	96*	14.79	16.51

Notes: (1) \* - In tonnes per hectare

(2) Base year for projections, 1983-84

(3) Æ - Total of cereals and pulses

Table 3.4(b) : Supply Projections for 2001

Sl. No.	Crops	Average Productivity of 5 years ending 1983-84 (kg/ha)	Projected level of productivity with		Projected level of production in million tonnes with	
			Moderate Growth rates	High Growth rates	Moderate Growth rates	High Growth rates
(kgs/ha)						
1.	Rice	2086	2876	3874	3.86	5.20
2.	Ragi	1203	1876	2354	2.40	3.00
3.	Total jowar	840	1310	1702	1.78	2.31
4.	Bajra	416	759	903	0.61	0.72
5.	Maize	2683	4568	13298**	1.35	1.47(3.92)
6.	Wheat	625	1266	1638	0.55	0.71
7.	Total cereals	1126	1756	2530	10.29	14.82
8.	Gram	465	608	894	0.25	0.37
9.	Tur	506	789	1080	0.33	0.45
10.	Total pulses	384	599	805	1.10	1.48
11.	Total foodgrains	970	1651	2034	12.71 (11.39)Æ	15.65 (16.30)
12.	Groundnut	738	88	948	0.77	0.83
13.	Cotton	118	168	270	0.17	0.27
14.	Sugarcane	79*	94*	123**	21.06	22.40 (27.6)

Notes: (1) \* - in tonnes per hectare

\*\* - This level of productivity is too high and in the case of these crops the growth rate may decelerate. The actual projected figures are shown in the brackets.

(2) Base year for projections is 1983-84

(3) Æ - Total of cereals and pulses



Another set of projections were obtained by assuming different rates of overall growth (see table 3.5). These growth rates were selected taking hints from the studies of Karnataka's agriculture and state's plan documents<sup>52</sup>. The scenarios emerging here are different than those obtained in table 3.4 both in terms of overall picture and also crop combination. In these projections, we find that the emphasis on pulses, maize and wheat gets subdued whereas sugarcane and cotton has an added emphasis. As mentioned earlier it is difficult to get to a growth rate of more than 1.5 per cent in the case of sugarcane both because of constraint on irrigation and the potential of the varieties. Even so, the question whether we need any such emphasis especially for sugarcane will have to be kept in mind.

This question leads us back to the focus of the study. We have thus far obtained the projections of the requirements and now we have looked into the production possibilities. If we juxtapose these two results, we should be able to answer the question whether the

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52. i) V K R V Rao (ed); Planning in Perspective, Allied, Delhi, 1978.  
See Chapter V

- ii) L S Venkatarmanan and K V Govindaraju (1985)
- iii) M Prahladachar and S H Sunder raju, "Agricultural Development in Karnataka", Research Report, ISEC, 1981
- iv) "Growth of Agriculture in Karnataka - 1960-61 to 1975-75", Economic Advisers Division, Planning Department, December, 1977
- v) M V Nadkarni and R S Deshpande, Op.Cit., (1979)

Table 3.5: Supply Projections at different levels of growth Rates for 2001 A.D.

(in million tonnes)

Sl. No.	Crops	Average Production 1980-81 to 1984-85	Assumed rates of growth			
			3.0%	3.5%	4.0%	4.5%
1.	Rice	2.29	3.78	4.10	4.46	4.63
2.	Ragi	1.23	2.03	2.21	2.40	2.49
3.	Total jowar	1.66	2.74	2.98	3.23	3.36
4.	Bajra	0.24	0.40	0.43	0.47	0.49
5.	Maize	0.39	0.64	0.70	0.76	0.79
6.	Wheat	0.19	0.31	0.34	0.37	0.38
7.	Total cereals	6.15	10.16	11.04	11.98	12.43
8.	Gram	0.06	0.10	0.11	0.12	0.13
9.	Tur	0.17	0.28	0.31	0.33	0.34
10.	Total pulses	0.55	0.91	0.99	1.07	1.11
11.	Total foodgrains	6.70	11.07	12.02	13.05	13.55
12.	Groundnut	0.65	1.07	1.17	1.27	1.31
13.	Cotton	0.94	1.55	1.69	1.83	1.90
14.	Sugarcane	13.3	21.98	23.87	25.91	26.89

- Note:
- i) \* - In the case of sugarcane any growth rate beyond 1.5 is not feasible with the present varieties and availability of irrigation
  - ii) Base year assumed at 1984-85
  - iii) For gram, average is based on 5 years ending 1983-84



agricultural sector of the state can be self-sufficient . We may look into the results obtained in table 2.19 giving the compendium of demand projections and those presented in tables 3.4 and 3.5. It is obvious from the comparisons of the three tables that in order to match the demand projections we may have to choose between "moderate growth" picture presented in table 3.4 or the scenario with the assumed growth rate of 3.5 per cent per annum.

The comparison brings out the following important points:

- (i) The requirements of the foodgrains can be met with moderate efforts. In other words, the state can achieve self-sufficiency (if it is defined in that way) with moderate rates of growth across crops or with an overall rate of growth of about 3.5%.
- (ii) Even with moderate rates of growth of rice, wheat, and pulses, the state may face deficit i.e., the requirement or demand is likely to exceed supply of these commodities by 2001 A.D. Hence targeted growth rates should be higher for these crops. We prefer the policy of differential growth rates across crops which would correct the prevailing inter-crop imbalances in the growth rates.
- (iii) Maize, wheat and jowar are the crops with high growth potential and the surplus production of these crops can cover the deficit in production of some other crops. Since, maize is reaching the saturation level of productivity, the best strategy to attain high production growth for this crop is to increase area under its cultivation.
- (iv) Though rainfed agriculture has helped in boosting the crop-wise overall growth rates, irrigated agriculture has not lived upto the expectations. It is disturbing to note that 57 per cent of the double cropped area is rainfed as against only 43 per cent in the irrigated area. Even with the corrections for the area under annual crops in the irrigated region, the performance is not very encouraging. In a way this may also reflect the over-exploitation of ground water leading to decline in area under rabi crop in the case of well irrigated agriculture and inadequate water supply from tanks owing to silting of tanks. This needs further probing before any future irrigation policy is formulated.

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53 We are aware that we are covering only one portion of the agricultural sector but this covers more than 85% of the land and resources of the sector. Getting into the inter-sectoral linkages is the task of macro-planners and we do not intend to do that here.

(in million tonnes)

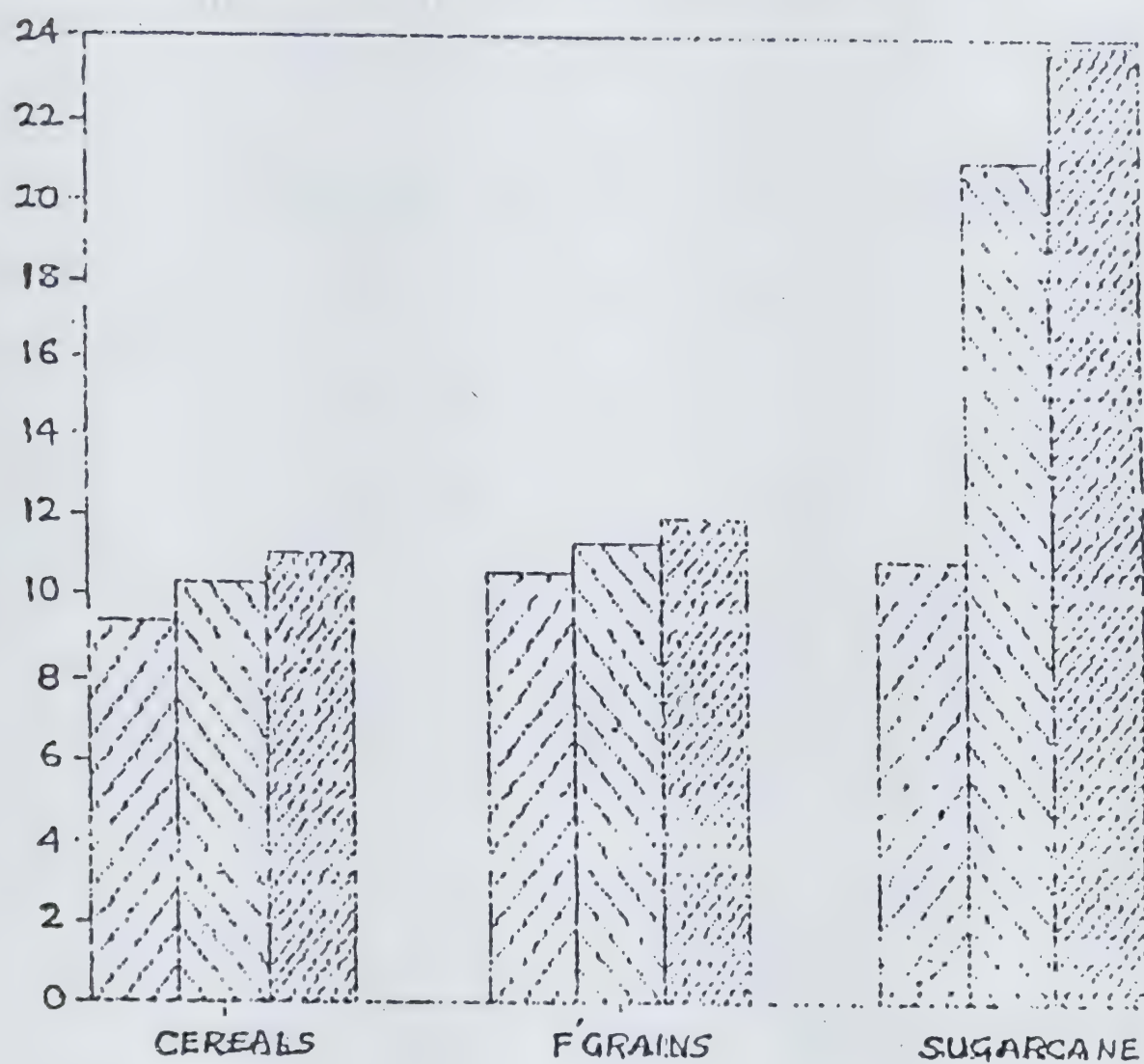
Sl. No.	Crops	1991					2001				
		Supply scenario		Demand		Differential growth rate: of 3.5% Moderate	Supply scenario		Demand		Differential growth rate of 3.5% Moderate
		Demand	Differential growth rate: of 3.5% Moderate	Demand	Differential growth rate: of 3.5% Moderate		Demand	Differential growth rate of 3.5% Moderate	Demand	Differential growth rate of 3.5% Moderate	
1.	Rice	3.66	3.06	2.91	4.36		3.86		4.10		
2.	Ragi	1.47	1.79	1.56	1.73		2.40		2.21		
3.	Total jowar	2.31	1.84	2.11	2.73		1.78		2.98		
4.	Bajra	0.22	0.39	0.31	0.25		0.61		0.43		
5.	Maize	0.24	0.73	0.50	0.29		1.35		0.70		
6.	Wheat	0.65	0.35	0.24	0.80		0.55		0.34		
7.	Total cereals	7.47	8.29	7.82	9.37		10.29		11.04		
8.	Gram	0.07	0.20	0.08	0.08		0.25		0.11		
9.	Tur	0.33	0.24	0.22	0.38		0.33		0.31		
10.	Total pulses	1.02	0.86	0.70	1.25		1.10		0.99		
11.	Total foodgrains	8.93	0.09	8.52	10.62		11.39		12.02		
12.	Groundnut	0.49	0.73	0.83	0.58		0.77		1.17		
13.	Cotton	-	0.14	1.20	-		0.17		1.69		
14.	Sugarcane	8.22	14.79	16.92	10.93		21.06		23.87		



- (v) The production performance of oilseeds and pulses needs to be monitored carefully. These two crops may continue to face the same level of deficit if corrective measures are not taken immediately. These two crops have tremendous potential in the State, because of the vast rainfed areas and their suitability to the soil and climatic conditions. A major factor in the low productivity of these two crops is mainly because of the skewed resource allocation as compared to the other crops. Both the crops are grown on marginal lands and claim only the residual resources of the main crop economy. In the case of both the crops there is a marked over dependence on a single crop type. Early maturing varieties of these crops would go a long way in bridging the deficit. Crop combinations like paddy - pulses - ragi or ragi - pulses - paddy in irrigated zone and the ragi - pulses or pulses-ragi-groundnut for rainfed region would help in increasing production of these crops. Apart from this the research inputs and feedback to the researchers from these crops are also very limited. Shortages in the seed market (of popular varieties) also act as constraint for growth.
- (vi) One of the strong assumptions of our projection exercise was the continuation of the present cropping system along with its sub-systems component in future. In fact our experience in Karnataka is that the cropping system of the south interior and coastal Karnataka is undergoing a gradual change. Changes are taking place in the north Karnataka region also. The importance of sericulture, horticultural crops, sun-flower and other vegetables is increasing in the cropping system. We could not cover these crops in our demand-supply scenario because of the scanty nature of the time series data and the meagre coverage in terms of area under these crops. Inclination of the farmers is more towards low volume - high value crops. Hence these crops will form major components of tomorrow's agriculture in the rainfed as well as irrigated areas.

Fig A-IV

## DEMAND SUPPLY BY 2001 AD

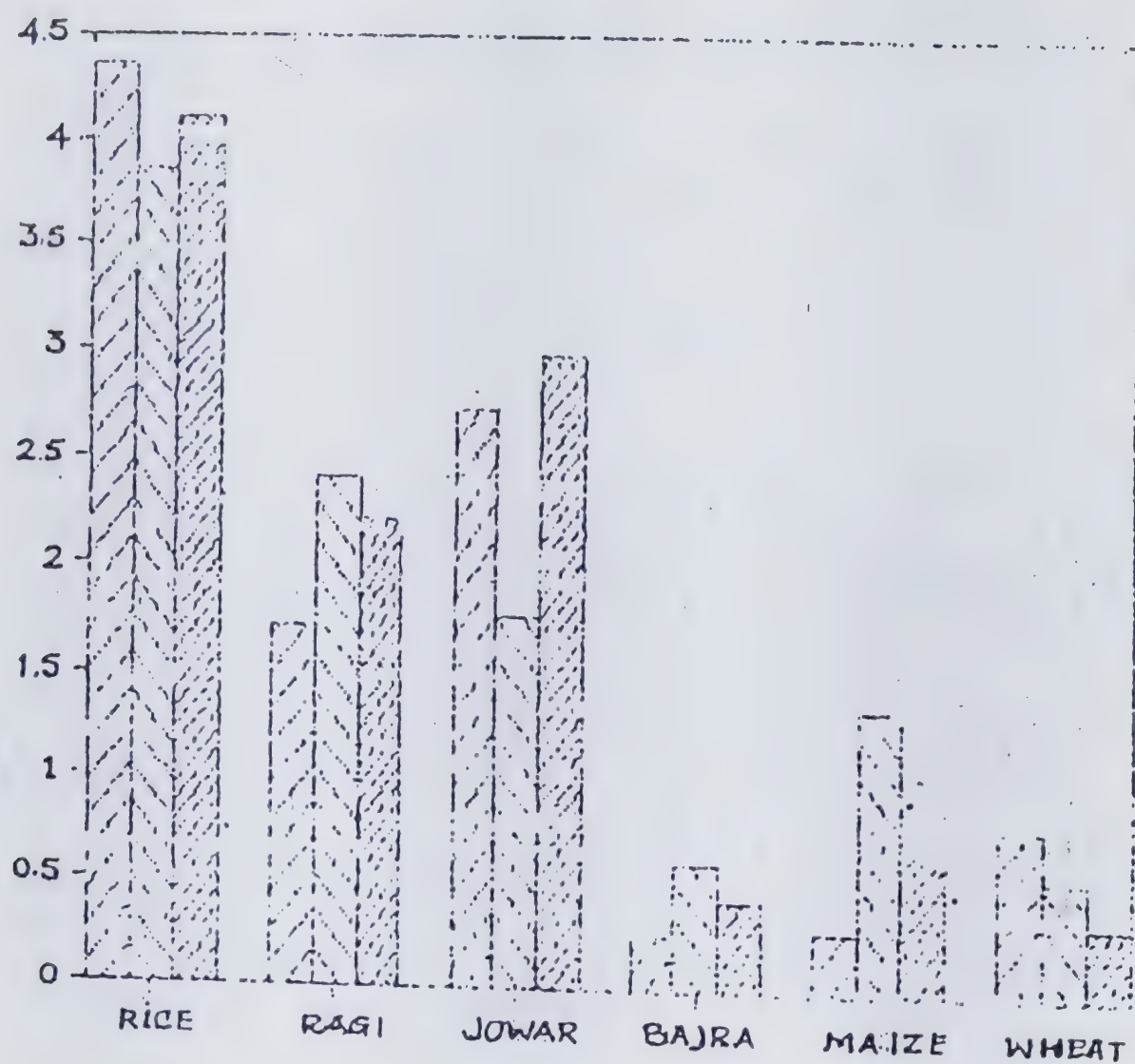


Legend :

As in fig A-I



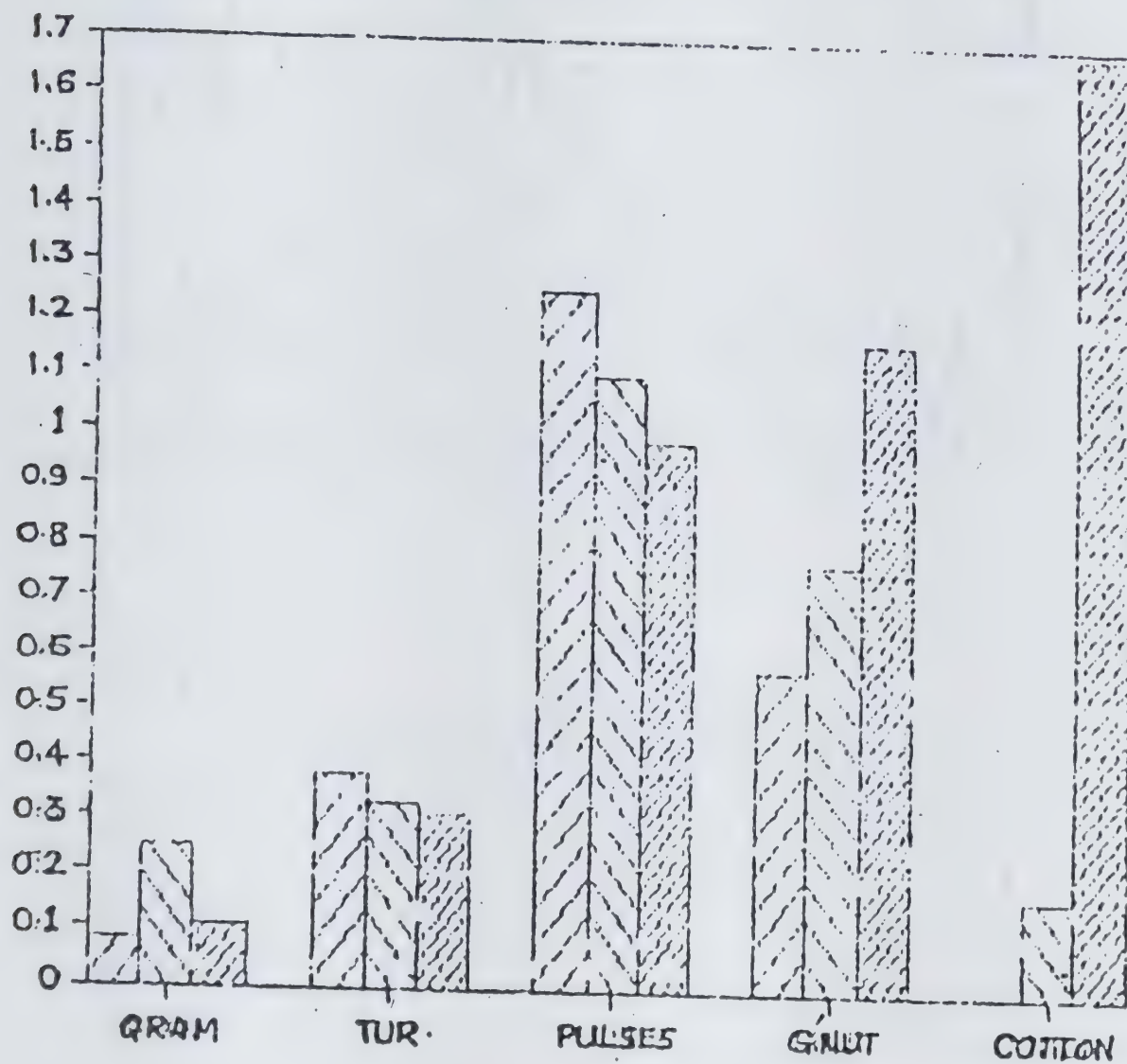
## DEMAND SUPPLY BY 2001 AD



Legend :

As in Fig. A-I

# DEMAND SUPPLY BY 2001 AD

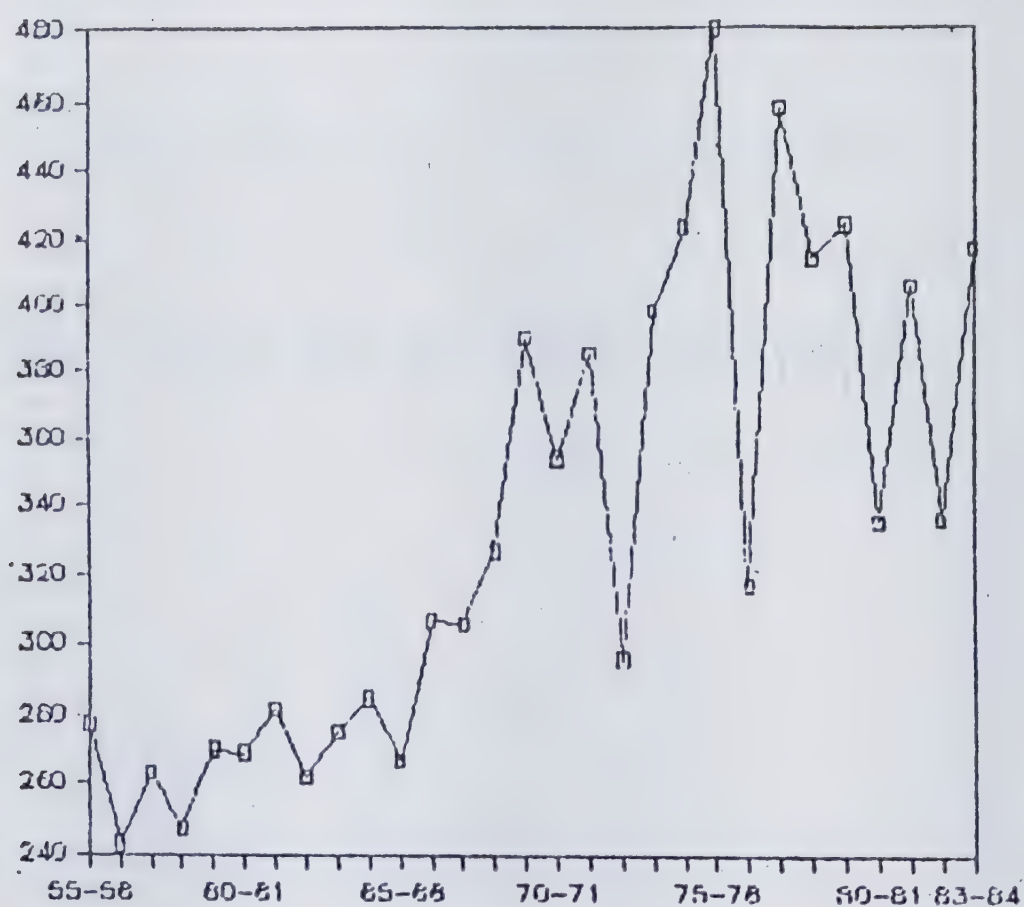


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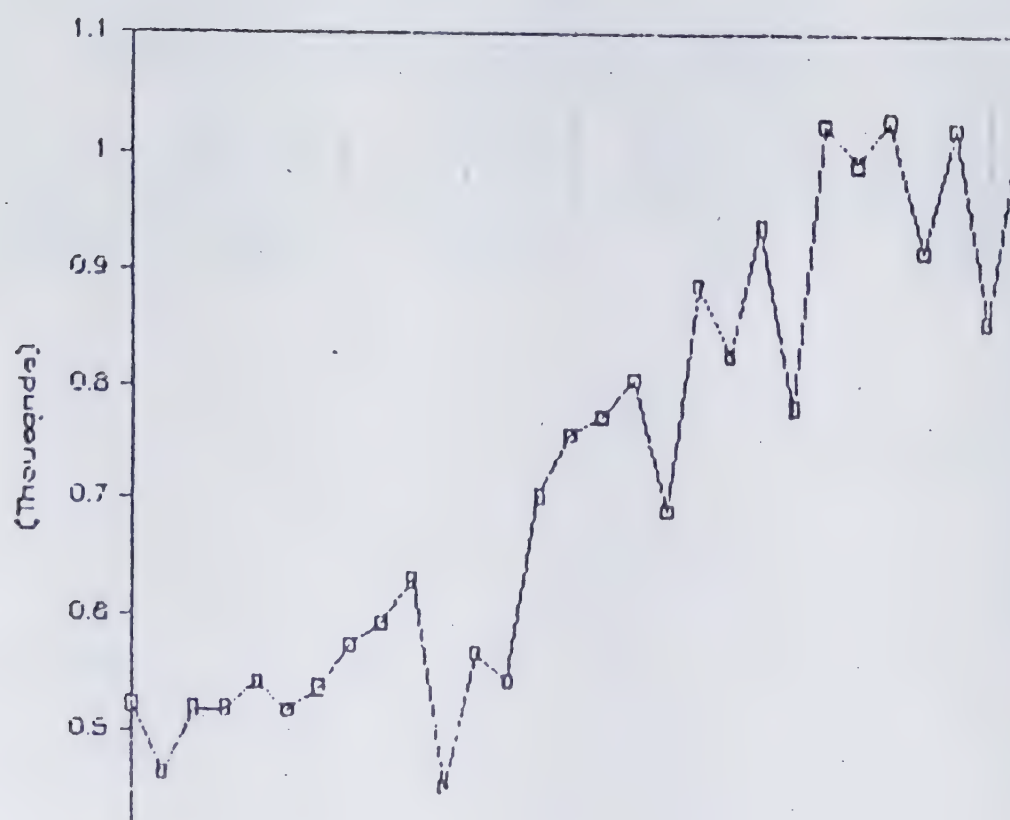
As in Fig A-1

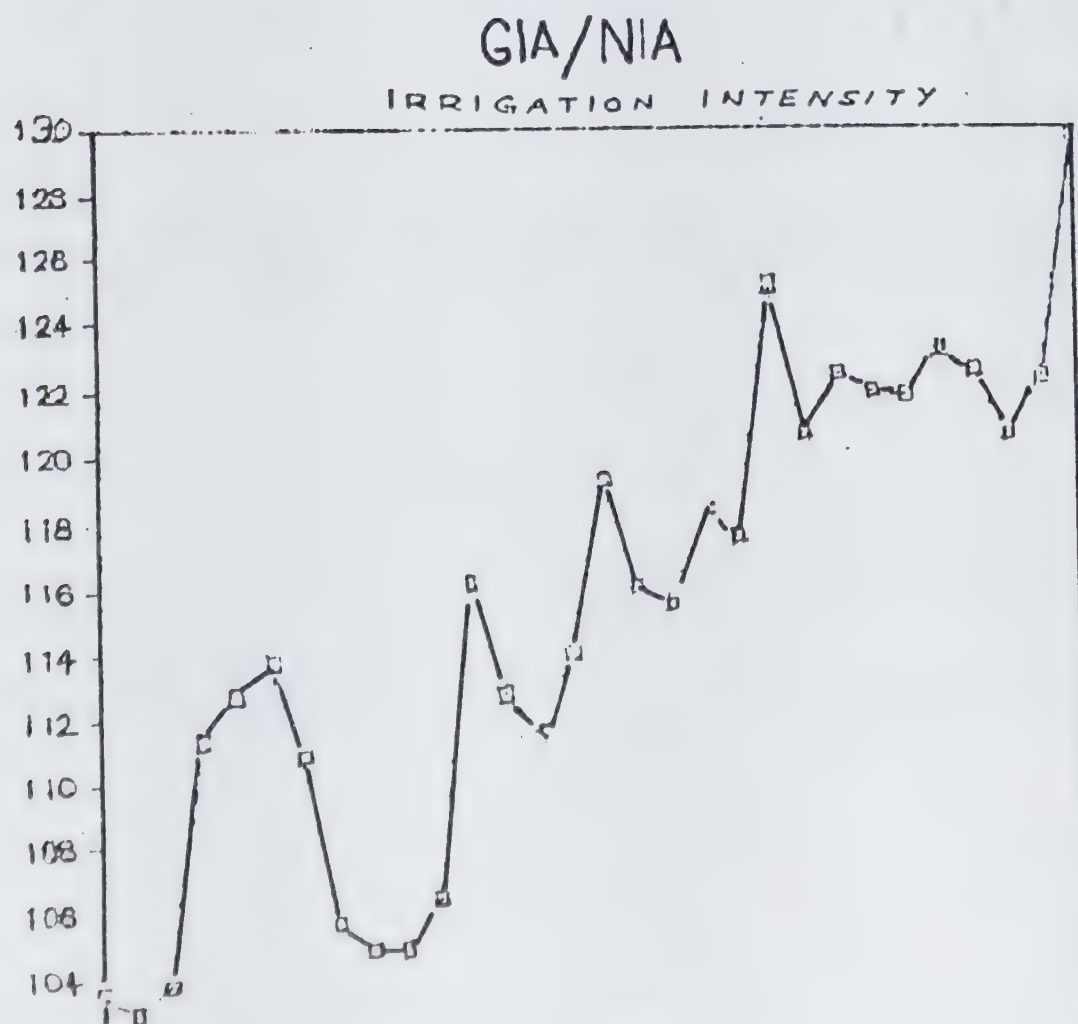
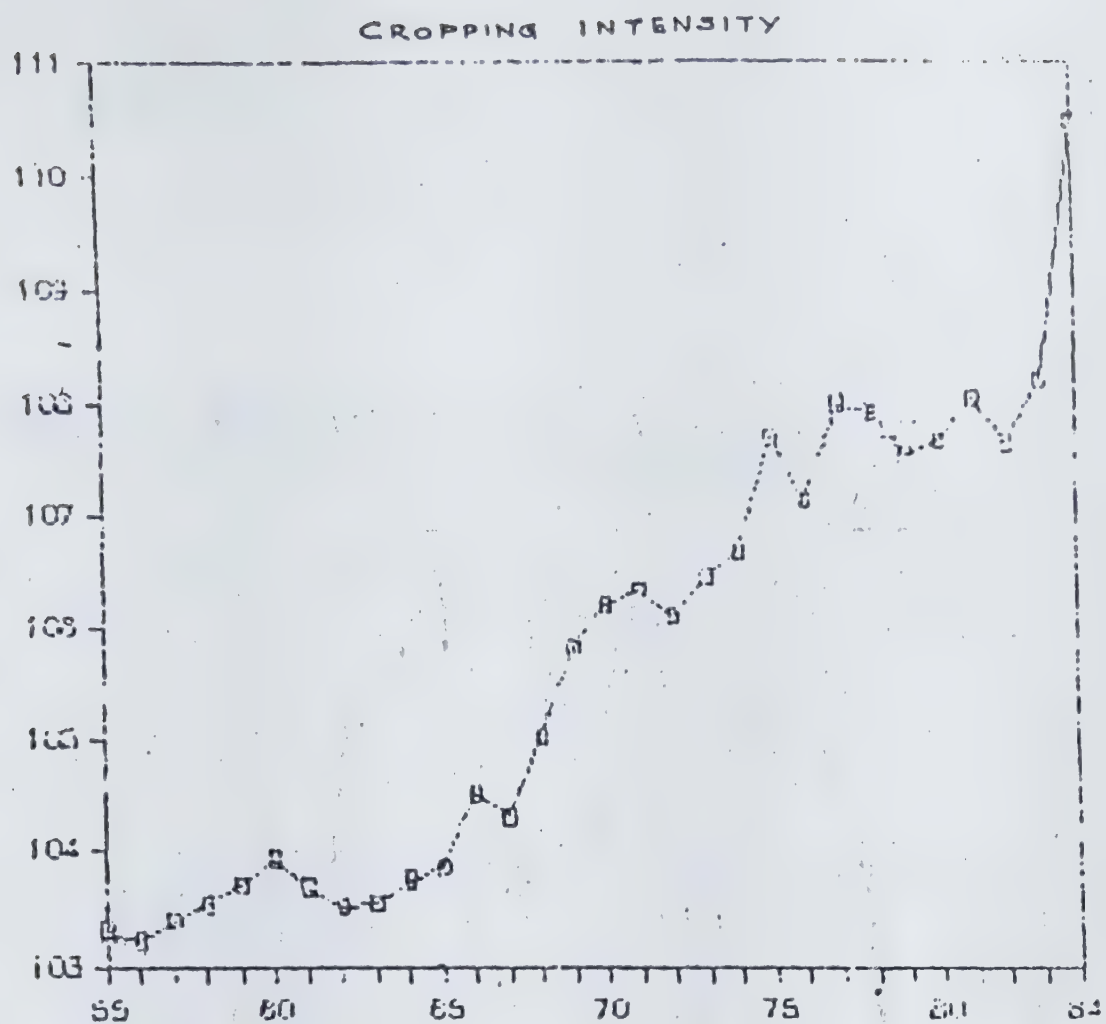


# TOTAL PULSES



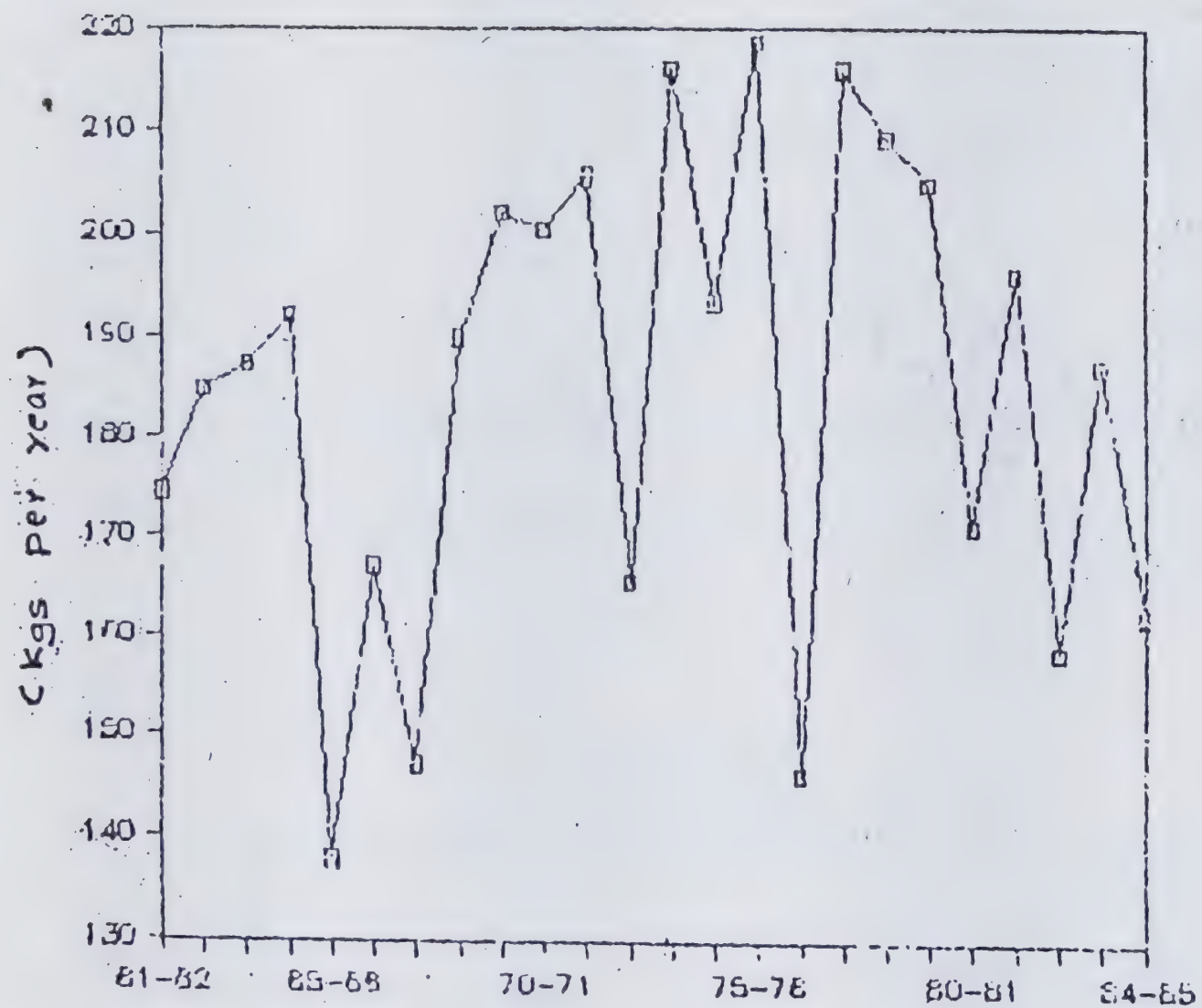
# TOTAL FOOD GRAINS







## PERCAPITA PRODUCTION



## PERSPECTIVE PLANNING IN INDIA: A REVIEW

by  
G.Thimmaiah

### Background

The concept of perspective plan originated in the Russian experiment with government sponsored planning for socio-economic development. It was Lenin who thought of this idea when he emphasised that "We cannot work without a long-term plan that envisages important<sup>1</sup> achievements". The well-known perspective plan was the Soviet Plan for electrification of Russia which is popularly known as GOELRO. This plan aimed at not merely supplying power to rural areas, but also used power as a means of achieving socio-economic change in rural Russia. It laid the foundation for the transformation of a backward society into a progressive nation.

In the Soviet Union, perspective planning involved identification of future goals of the society and a broad horizon of development. For instance, in the Soviet Union, the perspective plan indicated its objectives as a steady increase in the general standard of living of the working people on the basis of optimal allocation of resources among all sectors of the economy and their optimal use in each sector. Thus, from the Russian experience, it is evident that a perspective plan involves basically an attempt to forecast the developmental trends for a period of, say, 10 - 15 years.

A Perspective plan in general is expected to identify the long

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1. V.I. Lenin, Collected Works, Vol.35, Progressive Publishers, Moscow, p.511.



term socio-economic goals of a society and outline the broad strategy for achieving them. The strategies for achieving such long-term goals should be based on not merely the resources available at the time of formulating them but more importantly should take into account the resources of the future, including new technology and the possibilities of mastering it and more extensive as well as better use of natural and human resources. And such forecasting exercise should encompass economic variables as also social trends.

#### Perspective Planning In India: Early Attempts

In the Indian context, the idea of a perspective plan was conceived by Sir M. Visveswaraya as far back as 1934 in his book Planned Economy for India. He outlined a long-term plan for the development of British India after reviewing the planning experiments of pre-war Europe and Russia. He suggested a 10-year plan for the development of India, and three nation building activities viz., education, industrialization and military training, were considered as vital for India's progress. While his emphasis on education and industrialization is understandable, it is anybody's guess as to why he laid such emphasis on military training. He listed further details in the form of 10 urgent requirements for achieving rapid progress in India. They were: (1) elementary mass education, (2) training in defence, (3) industrialization with special attention to heavy industries, (4) a comprehensive survey of resources and collection of statistics according to international standards, (5) balanced occupations and arresting the tendency to ruralization, (6) Indian control of finance, (7) Indian control of purchases of the railway and

the army, (8) Indian control of railway administration, (9) Indian control of protective tariffs and railway freight, and (10) training in the highest branches of administration, commerce and technology.<sup>2</sup> He justified a 10-year long-term plan in the following words:

"A 10-year period is recommended for the plan and not a five-year or other shorter one, because the official statistics available are inadequate and there has been no survey of resources carried out, and no country-wide organisation of any sort exists for the production of wealth. In these circumstances, an estimate for 10 years would be more elastic and better adapted to the realization of the objectives of the plan".<sup>3</sup>

Accordingly, on the basis of such long-term perspectives, he outlined development prospects for agriculture, industry, trade and commerce and other sectors of India's economy. This book appears to have influenced the thinking of the national leaders on the future development course for free India. This was evident from the fact that Sir M. Visveswaraya was invited to serve as a member of the National Planning Committee in 1938.

In pursuance of a resolution of the Conference of Ministers of Industries of the then Provinces which was held in Delhi on 2nd and 3rd October, 1938, a National Planning Committee (NPC), was appointed under the Chairmanship of Subash Chandra Bose, the then President of the Indian National Congress. This Committee prepared a plan for the development of industries. The Committee defined planning in the following way:

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2. Ibid. pp.347-348, 3. Ibid. pp.268-269.



".....Planning under a democratic system may be defined as technical co-ordination, by disinterested experts, of consumption, production, investment, and income distribution in accordance with social objectives set by bodies representative of the nation. Such planning is not only to be considered from the point of view of economics and the raising of the standard of living, but must include cultural and spiritual values and the human side of life".

"Such a plan, thus, requires a social objective and the power and authority to give effect to the plan. If this power is limited in any way or there are other restrictions, political or economic, which come in the way of working out of the plan, no comprehensive planned economy can develop".

It is of particular relevance to note that the NPC very clearly identified the scope of a perspective plan as not merely the economic development but also cultural and spiritual development, particularly with reference to the human side of life. The reference to such a social goal seems to have been influenced by the Russian experience in perspective planning, though the post-independence plans formulated by the Planning Commission have relegated such social goals to the background. The NPC plan laid down the objectives of a comprehensive plan in terms of the following priorities:

- 1) The improvement of nutrition from the standard of irreducible minimum requirement of proteins, carbohydrates and minerals (as well as necessary protective foods) having a calorific value of 2400-2800 units for an adult worker.

2) The improvement of clothing from the present consumption of about 15 yards on an average to atleast 30 yards per capita per annum.

3) Housing standards to reach atleast 100 Sq. Ft. per capita.

In order to achieve these three long-term primary objectives, NPC wanted the following sectoral plans to be formulated for,

- 1) increase in agricultural production
- 2) increase in industrial production
- 3) diminishing of unemployment
- 4) increase in per capita income
- 5) liquidation of illiteracy
- 6) increase in public utility services
- 7) provision of medical aid on the basis of one Health Centre for 1000 population.
- 8) increased average expectation of life.

The Committee outlined sectoral development programmes and also recommended the public sector ownership of defence industries, key industries and public utilities.

Prompted by the National Planning Committee's work on planning, a group of eight leading industrialists of Bombay prepared A Plan of Economic Development for India, in January 1944, which came to be popularly known as the 'Bombay Plan'. This plan was a 15-year long term plan, envisaging a total outlay of Rs.10,000 crores. It contemplated a 130 per cent increase in agricultural output and 500 per cent increase in industrial output. The plan also made a plea for ensuring a more equitable distribution of income.

As was expected, the Bombay Plan which came to be associated with the names of industrialists, created a competitive urge among labour leaders to produce their own plan. Accordingly, the Post-war Reconstruction Committee of the Indian Federation of Labour prepared a



perspective plan in 1944 which came to be popularly known as the People's Plan.<sup>4</sup> The main objective of this plan was to increase the production capacity of the country in order to satisfy the most elementary requirements of the people - food, clothing, shelter, health and education. The People's Plan gave priority to agriculture in the first phase and to industrial development in the second phase. The People's Plan envisaged sectoral plans for the development of agriculture, basic industry, communications, health education and housing. The plan envisaged increase in agricultural production by 400%, industrial production by 600% and the standard of living of the masses by 300%. The total outlay envisaged was Rs.15,000 crores spread over 10 years. A distinguishing feature of this plan was that it aimed at fulfilling the basic needs and all other targets were derived from this one objective. Further, it clearly outlined the institutional changes required to achieve social development along with economic development. They included nationalisation of land for creation of State farms, liquidation of rural indebtedness, etc. This plan envisaged a prominent role for the public sector in almost all fields of economic activity.

It is interesting to mention here that the Second People's Plan<sup>5</sup> came to be prepared by the Indian Renaissance Institute in 1977. V.M.Tarkunde, who was actively involved in the preparation of the First People's Plan in 1944, was also involved in the preparation of the Second People's Plan. This Second People's Plan

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4. Indian Federation of Labour, People's plan for Economic Development of India, 1944.

5. Indian Renaissance Institute, People's Plan-II: A Plan for India's Economic Development, New Delhi, 1977.

was prepared against the background of the plan holiday which was observed during 1966-69 and the failure of the post-independence three Five Year Plans to improve the living conditions of the masses. The plan was also a ten-year long-term plan covering the period from 1978-79 to 1988-89 and aimed at four objectives: (1) meeting minimum consumption needs of the people, (2) creation of employment opportunity through productive investment, (3) reduction of inequalities of income and wealth, and (4) elimination of absolute poverty. This plan also laid emphasis on the development of agriculture as the first priority. Small scale industries were given prominence under industrial development. People's participation and decentralisation of decision making, particularly in matters relating to planning were also emphasised. The plan envisaged a total outlay of Rs.1,63,090 crores to achieve an 8% increase in GDP per annum.

Though all these pre-independence exercises in perspective planning were for long periods, it is very difficult to characterise them as attempts to formulate perspective plans mainly because the type of social as well as economic perspectives which were considered as essential features of the Soviet perspective plan were lacking in the plans. Some of these plans, no doubt, had long-term targets mainly because of the non-availability of reliable data for formulating medium-term plans and also because it was very difficult to think of medium-term plans when the country was not politically free to plan for comprehensive socio-economic development. Planning without political freedom was rightly considered as a fruitless exercise. Hence these 10-year long-term plans were mainly in the nature of medium-term development plans with some cushion allowed for the period





required for achieving independence and consolidating the political power to start Government initiated development plans.

Subsequently, after the assumption of power by the interim Government, the Government of India appointed an Advisory Planning Board on 26th October, 1946, under the Chairmanship of Mr.K.C.Neogy. This Advisory Planning Board had the benefit of the work of NPC and also, one of the members of the National Planning Committee, Professor K.T!Shah, served on the Advisory Planning Board. However, this Advisory Planning Board did not bother to prepare any perspective plan but was only interested in starting immediate plan programmes. Therefore, it confined itself to immediate post-war reconstruction and development exercises.

#### Perspective Planning Under The Five Year Plan Regime

After independence, it was decided to make economic planning as an integral part of post-war economic policy. The Government's decision to constitute the Planning Commission for formulating development plans for the entire country was announced in January 1950 through the President's address to Parliament. Though the idea of planning was widely debated in the public and in political and intellectual circles during the post-war years, the framers of the Constitution did not devote as much time as required for the integration of planning into the Indian Constitution. Opinions were divided on whether the Central Government should have the subject of planning in the Union List, or it should be entrusted to the State governments by listing it under the State List. Jawaharlal Nehru was in favour of placing it in the Union List, whereas Meenu Masani and

others were in favour of to putting it into the State List. Ultimately, a compromise was arrived at and it was placed in the Concurrent List. This episode, though it appears frivolous has got a bearing on the future developments in the nature of the planning process in India.

The Planning Commission was set up in March 1950 by a resolution of the Government of India and the Planning Commission prepared a Draft outline of the plan of development for the period of five years from April 1951 to March 1956. This Draft was prepared in July 1951 and was discussed by the Central and State governments, in Parliament and in most of the State legislatures and also by the public and in educational institutions. Finally, the First Year Plan was finalised, which envisaged an outlay of Rs.2069 crores as against the outlay of Rs.1493 crores contemplated in the Draft Outline. The relative sectoral priorities remained more or less the same between the Draft Outline and the final First Five Year Plan. This plan included a number of development projects which had already been undertaken, as also others which were contemplated but not yet undertaken as a part of the post-war reconstruction programme.

The First Five Year Plan contemplated a 15-year perspective plan. This is a noteworthy attempt, particularly in the context of the absence of any commendable development strategy in the First Five Year Plan. As it has already been mentioned earlier, the First Five Year Plan brought together certain programmes and projects which were already contemplated at that time for post-war reconstruction and rehabilitation. The major thrust of the First Five Year Plan was to achieve self-sufficiency in foodgrains. Other than this, the plan only



contemplated achieving macro targets like increase in national income and per capita income. The perspective plan which was contemplated in the First Five Year Plan envisaged a long-term perspective of doubling the per capita income and increasing savings and investment rates over a period of 15 to 27 years. It was estimated that in 1950-51, the saving rate would be about 5 per cent. This was proposed to be increased to 6.75 per cent in 1955-56, to 11 per cent by 1960-61 and to 20 per cent by 1967-68. It was also envisaged that capital formation would be increased to 20 per cent by 1968-69 and per capita income would be doubled between 1950-51 and 1977. This would give 70 per cent increase in the per capita income from the level of 1950-51.

After the completion of the First Five Year Plan in 1956, the actual results were compared with the original targets. This comparison showed the phenomenal success of the First Plan. It may be observed that the First Five Year Plan contemplated an increase of national income from Rs.9,110 crores in 1950-51 to Rs.10,000 crores in 1955-56. But the actual level of national income was higher than the originally envisaged target. So also the volume of investment rate. Thus the first medium-term plan was a grand success in terms of its macro economic targets.

Encouraged by this success, the Second Five-Year Plan launched upon an ambitious perspective as well as a Five Year Plan. Unlike the First Five Year Plan, the Second Five Year Plan was based on a clearly thought out strategy of development. The Second Five Year Plan identified development of basic industries as a long-term strategy of development. It was also based on a macro economic model of

development prepared by P.C. Mahalanobis. Thus the thrust of the Second Five Year Plan was industrialisation and the model used for formulating the draft Second Five Year Plan did have a perspective. This plan contemplated achieving self-sufficiency in capital goods over a period of 15 years. The long-term perspective of growth on income and investment contemplated at the time of the Second Five year Plan is presented in Table 2. It may be observed that the Second Five Year Plan had a long-term perspective of 20 years as compared to the 15 to 27 year period of the perspective plan contained in the First Plan. Unlike the earlier perspective plans, the 20-year perspective plan projected the macro variables within the framework of the Mahalanobis model. This model was based on the investment rate, incremental capital-output ratio and the saving rate. These variables were assumed to determine the macro economic targets relating to national income. The population growth and the growth in the national income determine the growth in the per capita income. Accordingly, all these target variables and the determining variables were projected from 1956 to 1976.

From the Second Five Year Plan onwards, long-term perspective planning exercise became a regular feature of the Five Year Plan documents in India. But these perspective plans have been, by and large, prepared within the frame work of the Mahalanobis model. A minor change which was introduced during the Third Five Year Plan was that the poverty of the masses was included as a target variable and the growth of national income and its distribution was targetted for achieving reduction of the poverty level. For the first time, a comprehensive document outlining the detailed targets of the long-term



perspective plan was prepared at the time of the Third Five Year Plan. Even so the successive perspective plans remained macro target orientated.

Some of the major characteristics of the post-Second Five Year Plan Perspective Plans are the following:

National income and per capita income have been the major target variables. Per capita consumption was added during the Third Five Year Plan and has continued as a target variable with a view to reducing the percentage of people in absolute poverty. These macro target variables were contemplated to be achieved by influencing or varying their determining variables as they are assumed to be technically interrelated. The saving rate, investment rate and rate of capital formation, rate of growth of population and incremental capital-output ratio are assumed to determine the rate of increase in the GDP and per-capita GDP. The 'trickle down' process of GDP growth was assumed to increase per capita GDP and per capita consumption which would in turn reduce the poverty ratio. In terms of actual realisation of the macro targets of the perspective plans, Indian perspective plans have been a grand failure. This is evident from the actually realised targets presented in tables 3 and 4. It may be observed that except in the case of foreign aid or imports and hence investment, the actual realisation of all other macro variables were far below the original targets.

It is also interesting to remember that the perspective plans have become rolling plans in the sense, that at the end of every Five Year Plan, instead of continuing the remaining phase of the earlier

perspective plan according to its original targets, new perspective plans have come to be formulated for the next 15 years or so. This would mean that the Five Year Plans did not want to continue the originally contemplated perspective plan till the end of the contemplated period. Therefore, the perspective plan became a rolling plan all through the Indian Five Year Plan regime.

What is more, during the 1970s and 1980s sectoral perspective plans like perspective plan for the development of railways, electronics etc., have come to be formulated, thereby reducing the scope of even the overall macro economic perspectives. Though such sectoral perspective plans have got their own advantage, we cannot forget the fact that such perspective plans are resorted to, either as preparatory to comprehensive national perspective planning as it happened in Russia, or the main stay of indicative planning as in France. Increasing number of sectoral perspective plans has given rise to the obvious doubt about the Government's commitment for comprehensive planning in India.

It may be observed that the post-independence perspective plans are very much influenced by the macro economic models and therefore realistically included national income, per capita income and per capita consumption as target variables. From these target variables, the specific objectives of the Five Year Plans were derived. Most of the Five Year Plans started with the macro variables target objectives, viz., increasing the rate of growth of national income /or per capita income. From such macro target objectives, they derived all other objectives like increasing the sectoral growth rates, composition of the sectoral output, exports, imports and even



employment generation. This is in contrast to the People's Plan which contemplated social goals as the pre-eminent objectives of any planning. In fact, the Second People's Plan prepared by the Indian Rationalist Institute has indicated the humanistic goal of meeting the basic needs and poverty elimination as the most important objectives of future Five Year Plans.

The control variables in perspective plans have been saving rate, investment rate, incremental capital-output ratio and population growth. Even foreign aid has been treated as a residuary explanatory variable. Since the perspective plans have not bothered about social goals and strategies for social change, they have not contemplated any social indicators and the corresponding social policy instrument. Indian perspective plans never contemplated development planning as a means of social development.

All the perspective plans and even the Five Year Plans have assumed constant prices i.e., the prices prevailing at the beginning of the plan period, that is, base year prices. This assumption is based on the logic that it is difficult to anticipate the rate of increase in prices during the Five Year Plan and Perspective Plan periods. This inability has been evident even after using a detailed input-output matrix used for determining intersectoral supply and demand for establishing consistency relations between macro and sectoral micro-targets. Secondly, for political reasons the Government has not encouraged the Planning Commission to openly plan with inflation.

Though the First and Second Five Year Plans ritualistically mentioned the broader perspectives of development like institutional changes, required changes in the attitude of people, people's participation and so on, these non-economic goals were pushed to the background in the later Five Year Plans and the perspective plans never contemplated any long-term goals of institutional change, attitudinal change and the role of government as a change agent. This is in contrast to the perspectives contemplated in the People's Plan which was a much more comprehensive and holistic long-term development plan for a semi-feudal society.

The post-independence perspective plans did not integrate the strategies for changing the institutions and their structure in order to cope with the obstacles which the social instructions would create in the process of development. There was hardly any attempt to conceive of a long-term plan for people's participation and the decentralised process of planning for development which would have generated the urge for change at the grass roots level. Micro level planning and people's participation have never been contemplated in the long-term perspectives. The policies like land reforms, decentralisation of political power, etc., have only become public policies during the later Five Year Plans and even these have not been sincerely implemented as 'necessary complementary' programmes of development.

The post-independence perspective plans, by and large, did not contemplate any pre-determined path of change in the structure of the Indian economy. No doubt, the overall macro framework of all the Five Year and perspective plans was to transform the predominantly



agricultural economy into a modern industrialised economy, with a view to achieving self-sufficiency in capital goods. But the Indian plans never planned for socially desirable changes in the structure of the economy. In other words, the structural changes of the Indian economy in terms of changes in the composition of the national income was not contemplated in any perspective plans. These rolling perspective plans only reviewed the past achievements of macro targets and did not bother to notice the change which was taking place in the structure of the Indian economy vis-a-vis what was contemplated in the Mahalanobis model. No doubt, the later Five Year Plans projected sectoral composition of the GDP but only as a continuing trend in the structural change which started autonomously in response to blind market forces.

Both the Five Year Plans and the Perspective Plans underestimated the saving rate of the Indian economy till the 1960s. Correspondingly, they also underestimated the incremental capital output ratios. The actual levels of these two determining variables which emerged during the 1980s gave a rude shock to the planners' ability to predict future macro economic trends.

The successive perspective plans which were formulated did not pay much attention to the changing attitude of the private sector, particularly, the corporate sector, towards planning and government policy. Though, the private sector started opposing the dominant role given to the public sector during the Second Five Year Plan and vehemently criticised the industrial policy resolution and licensing system, subsequently the private sector adapted itself to the changing

situation and came to use the Five Year Plans for its own advantage. Thus the adaptive capacity of the Indian corporate sector has been much more dynamic, though concealed, than the adaptive capacity of the Indian planning strategies.

The greatest failure of Indian perspective plans has been their failure to contemplate social change as an integral part of economic development. Thus, economic development and social change have been contemplated as disconnected elements rather than an integrated whole. As a result, social change which has been taking place, consequent on, among other factors, political awakening of the masses, has been faster than the pace of economic development. This imbalance between the pace of random social change and the pace of systematic but distorted economic development have created socio-political tensions in the country.

The perspective plans have not estimated the specific ways and means of mobilising financial resources for financing the plans. They have only indicated overall saving and investment rates. They have not indicated even broad trends in different sources of savings and the complementary role which different policies intended to mobilise savings like taxation, borrowing etc., would have to play in achieving the social goals. This was obvious in their silence about the social change and absence of design for social development. Though one may defend it as inevitable in the context of the long-term uncertain future involved in such a perspective planning exercise, at least some broad indications are necessary for visualising the magnitude of the resource mobilisation task in the long run.



## Perspective Planning at the State Level

During the Fifth Five Year Plan period a number of State governments realised the importance of formulating perspective plans at the State level and initiated necessary action in that direction. Prominent among them were the States of Gujarat, Maharashtra and Tamil Nadu.<sup>6</sup> In these States both official and non-official efforts were made to formulate perspective plans for the development of the States. Subsequently, many other States attempted similar exercises. But by the time the Sixth Five Year Plan was formulated, the interest of the State governments in perspective planning withered away. Even so, some of the academicians continued their interest in perspective planning at the State level.

In Karnataka, the interest of the Government and academicians in perspective planning goes back to the 1930's.

It should be mentioned in this context, that Sir M. Visveswaraya who formulated a plan for the whole of India also prepared a plan for the industrialisation of the erstwhile Mysore State. Under the inspiring Dewanship of this able man, the erstwhile Mysore State embarked on a policy of industrial development. Many well conceived plans, both official and non-official, came to be formulated after he aroused people's interest in planning.

The first comprehensive economic plan for the development of the erstwhile State of Mysore was formulated by Professor

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6. See State Planning Commission, Government of Tamil Nadu, The Perspective Planning for Tamil Nadu: 1974-84, Madras, March 1974.

V.L.D'souza and S.L.N. Simha. Their plan was published under the title: 'Economic Planning for Mysore' in 1944. This was a fifteen year perspective plan starting from 1946. With an investment outlay of Rs.225 crores, it aimed at raising the per capita income from Rs.90 in 1946 to Rs.180 at the end of 1961 at 1938-39 price levels. The plan estimated the total income of the erstwhile Mysore State to be Rs.69 crores in 1946 and assuming a capital-output ratio of 2:1, it proposed to increase it by Rs.111 crores to reach the level of Rs.180 crores in 1961. The agricultural sector was expected to contribute 45 per cent of the increased State income, manufacturing sector 33 per cent, and other sectors, 22 per cent. The suggested allocation of the outlay was on the following lines:

Table 8: ALLOCATION OF OUTLAY UNDER THE FIRST PERSPECTIVE PLAN OF KARNATAKA, (ERSTWHILE MYSORE STATE), 1946 TO 1961.

(Rs. Crores)

Sector	Public Sector Outlay	Private Sector Outlay	Total Outlay
Agriculture	28	12.0	40.0
Industry	30	53.5	83.5
Transport	25	7.0	32.0
Housing	-	48.0	48.0
Health	6	-	6.0
Education	7	-	7.0
Miscellaneous	4	4.5	8.5
Total	100	125.0	225.0

The perspective plan contemplated financing the plan outlay from the balance from current revenues (including additional taxation), loans and deficit financing. The perspective plan recommended additional taxation measures like agricultural income tax, sales tax,



inheritance tax and upward revision of income-tax.

However, this perspective plan did not receive official sanction. This was mainly because, the then Government of erstwhile Mysore State was more inclined to accept only plans formulated by the officials of the State. Accordingly, in the same year, Shri P.H.Krishna Rao, the first Commissioner for Planning prepared a draft plan under the title "A Plan for the Economic Development of Mysore-A Draft". It was prepared by drawing on the salient features of the Bombay Plan and the People's Plan, as applicable to the erstwhile Mysore State. This plan document was prepared with a view to giving information and evoking public interest in the problem of planned development. The plan proposed an outlay of Rs.200 crores in the public sector over a period of 15 years. However, the plan did not specify the method of financing the outlay, except that it contemplated raising loan funds for meeting most part of the outlay. Thus, while the State government was reluctant to accept a non-official plan, the official plan was not as well conceived as the perspective plan prepared by the academicians. It is reported that this plan was implemented, though its implementation did not produce any tangible results in the State.

Professor V.K.R.V.Rao, who was invited to establish a Social Science Research Institute in Bangalore, initiated research work on the formulation of a long-term perspective plan for Karnataka. This exercise was, no doubt, basically an imitation of national level macro perspective plans. Even so, it tried to integrate the macro framework

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7. V.K.R.V.Rao (e), Planning in Perspective 1973-74 to 1988-89, Allied Publishers, New Delhi, 1978.

with detailed sectoral development perspectives. And this perspective can also suggest policy alternatives to reach the macro goals.

Deriving inspiration from the Perspective Plan drawn up by ISEC, the Planning Department of the Government of Karnataka prepared two macro perspectives.

The first Macro Perspective developed two sets of development models. The first model was in line with the national perspective and projecting macro target variables like GDP, per capita GDP and their corresponding determining variables like saving and investment rates and incremental capital output ratio. An interesting aspect of this model is that three alternative scenarios were contemplated, viz., feasible growth with moderate effort, feasible growth with greater effort and feasible growth with maximum effort. The main features of these alternative perspectives are presented in tables 10, 11 and 12. The detailed sectoral implications of these alternative growth paths were also indicated in quantitative terms.

The Second model was a consumption model probably intended for integrating equity parameter into the growth model. Based on the nutrition standard, the demand for foodgrains was projected. But the growth paths model and consumption model were not logically integrated. Therefore, they remained two independent approaches to development in Karnataka.

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Macro Perspective for Karnataka: 1978-88 and Perspective of development of Karnataka - 2005 A.D.



The Perspective of Development for 2005 A.D. presented a more modest approach to the long-term development of Karnataka. After reviewing the past performance of Karnataka's economy and identifying the pressing economic problems, the Perspective of Development outlined the desirable growth rates of aggregate SDP as well as sectoral SDP to achieve structural changes in the Karnataka economy. Besides, it tried to integrate equity parameters into the growth objective by estimating the desired increase in the level of per capita consumption expenditure. The implications of such objectives for the demand for foodgrains was also estimated. In brief, the Perspective of Development for 2005 A.D. was a modified version of the earlier Macro Perspective. It indicated specific policy measures in major developmental spheres and also some spatial perspectives. But the Five Year Plans of Karnataka which were formulated after these two perspectives were prepared, did not reflect the development models contemplated in them. This was probably because, the State's Five Year Plans had to fall in line with the national perspectives, development strategies, programmes and even schemes. It is in this context that the State level perspective plans are likely to remain as mere intellectual exercises as long as the rigid national Five Year Plan regime is continued to be imposed on the States.

Table 1: Main Features of Perspective Plans in India

Agency involved in preparation	Duration of the perspective plan	Spatial Coverage	Sec- total coverage	Main Target variables	Other features
1. Sir M. Visweswaraya (1934)	10 years	British India	All	Income Employment	Emphasis on industrialisation
2. Indian National Congress Party (1938)	10 years	British India	All	Standard of living	Prominence to Public Sector.
3. Industrialists (1944)	15 years	Entire undivided India	All	National income	Emphasis on industrial development.
4. Indian Federation of Labour (1944)	10 years	British India	All	Basic needs	Collective Farming and Public Sector Industries.
5. Indian Renaissance Institute (1977)	10 years	Independent India	All	Basic needs	People's participation.
6. Planning Commission (1951)	15 to 27 years	- " -	All	National Income	Doubling per capita income.
7. Planning Commission (1956)	20 years	- " -	All	National Income	Emphasis on industrialisation.
8. Planning Commission (1964)	15 years	- " -	All	National Income	Reduction of poverty
9. Planning Commission (1968)	12 years	- " -	All	National Income	Reduction of poverty
10. Planning Commission (1973)	15 years	- " -	All	National Income	Reduction of poverty
11. Planning Commission (1979)	15 years	- " -	All	National Income	Reduction of poverty
12. Planning Commission (1985)	15 years	- " -	All	National Income	Reduction of poverty



Table 2: LONG TERM PERSPECTIVES OF GROWTH OF INCOME (at 1952-53 Prices)

Variable	I Plan (1951-56)	II Plan (1956-61)	III Plan (1961-66)	IV Plan (1966-71)	V Plan (1971-76)
1. National Income (at the end of the period) (Rs. Crores)	10,800	13,480	17,260	21,680	37,270
2. Total net investment (Rs. Crores)	3,100	6,200	9,900	14,800	70,700
3. Investment as % of national income at the end of the period.	7.3	10.7	13.7	16.0	17.0
4. Population at the end of the period (Millions)	384	408	434	465	500
5. Incremental capital output Ratio	1.8:1	2.3:1	2.6:1	3.4:1	3.7:1
6. Per capita income at the end of the period (Rs.)	281	331	396	466	546

Source: Government of India, Planning Commission, Second Five Year Plan,  
New Delhi 1956.

Table : 3 PROJECTED AND ACTUAL MAGNITUDES OF MACRO VARIABLES CONTEMPLATED IN THE  
THIRD FIVE YEAR PLAN PERSPECTIVE

(At 1960-61 prices)

Variable	1960-61		1965-66		1970-71		1975-76	
	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
1. National Income (Rs. Crores)	141.4	133.35	180.0	152.94	260.0	191.48	973.0	223.82
2. GDP at market prices (Rs. Crores)	159.4	149.46	204.4	170.58	297.8	220.84	432.1	258.04
3. Population (millions)	439	434	492	485	555	541	625	607
4. Per capita income (Rs.)	322	304	366	314	468	353	597	369
5. Per capita consumption (Rs.)	301	276	313	278	379	311	480	312
6. Gross Domestic Expenditure: of which:	164.6	151.93	9.9	173.58	301.3	225.79	431.1	263.54
a) Capital formation	21.0	25.44	35.0	34.70	63.0	40.36	93.0	47.59
b) Public consumption	11.6	6.81	21.0	4.35	28.0	17.02	39.0	26.71
c) Private consumption	132.0	119.68	153.50	134.53	210.3	168.41	300.1	189.24
7. Foreign aid	.2	2.47	5.5	3.00	3.5	4.95	--	5.5



Table 4: PROJECTED AND ACTUAL MAGNITUDES OF MACRO VARIABLES CONTEMPLATED IN THE  
FOURTH FIVE YEAR PLAN PERSPECTIVE

Variable	1963-69		1973-74		1978-79		1980-81	
	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
1. GDP at factor cost (RS. crores)	168.37	171.12	221.90	201.88	299.46	259.86	337.2	262.98
2. GDP at market prices (RS. crores)	185.77	184.33	246.16	219.78	335.76	283.20	378.96	286.39
3. Population (millions)	527	518	596	530	666	649	690	679
4. Per capita GDP (RS.)	319.50	330.50	372.31	348.06	449.63	400.40	488.70	387.30
5. Per capita Private consumption (RS.)	289.73	307.80	300.00	300.89	381.00	384.30	410.00	340.00
6. Net Domestic Expenditure (RS. crores)	187.56	189.61	247.16	222.82	335.40	287.04	378.30	313.31
of which:								
a) Net investment (RS. crores)	20.56	19.56	35.04	35.87	55.00	50.10	65.30	63.11
b) Govt. consumption (RS. crores)	14.31	10.22	23.32	13.43	26.04	19.96	29.53	14.90
c) Private consumption (RS. crores)	152.69	159.43	178.80	174.52	254.36	216.98	283.50	230.30
7. Net imports of goods and services (RS. crores)	1.79	5.28	1.00	4.04	-0.36	3.84	-0.063	12.97

Table: 5 Projected Growth Rates of Macro Variables for the Perspective Plan  
Period: 1979-80 to 1994-95

(at 1979-80 prices)

Variable	Unit	1979-80	1984-85	1994-95
1. GDP	Rs. crores	9 7031	12503 (5.2)	213600 (5.5)
2. Population	Million	654.1	717.2	843.0
3. Per capita GDP	Rs.	1481	1744 (3.28)	2534 (3.81)
4. Saving GDP ratio	Percent	21.74	24.48	27.32
5. Investment GDP ratio	Percent	21.70	25.11	26.92
6. Population below poverty line	percent	48.44	30.00	8.74
7. Per capita monthly consumption	Rs.	95.52	109.67 (2.79)	151.98 (3.32)
8. Employment	(Million standard person years)	151	165	248
9. Food Grains	Million tonnes	109	149 to 154	205

Note: Figures in parantheses indicate projected growth rates.

Source: Planning Commission, Government of India, Sixth Five Year Plan: 1980-85, New Delhi, pp. 17-31,



Table: 6 Projected Growth Rates of Macro Variables for the Perspective Plan  
Period: 1977-78 to 1992-93

(at 1978-79 prices)

Variable	Unit	1977-78	1982-83	1987-88	1992-93
1. GDP at factor cost	Percent	-	4.7	5.5	6.0
2. Population	Million	629	692	755.2	818.4
3. Saving Rate	% of GNP	22.8	25.8	27.5	28.5
4. Aggregate private consumption	Rupees million	578370	719120	927750	1222370
5. Per capita consumption	Rupees	919.51	1039.19	1228.48	1493.61
6. Investment Rate	% of GNP	23.4	27.4	27.8	27.8
7. Growth Rate of aggregate private consumption	Percent	-	4.45	5.23	5.67
8. Growth Rate of per capita consumption	Percent	-	2.48	3.40	3.00
9. Food Grains	Million tonnes	123.61	142 to 146	166 to 168	187
10. Population below poverty line	Percent				
a) Rural	Percent	50.29	39.93	27.63	16.15
b) Urban	Percent	42.88	36.41	26.53	16.93
c) All India	Percent	48.71	39.14	27.34	16.34

Source: Planning Commission, Government of India, Draft sixth Five Year Plan: 1978-83 (Revised), New Delhi, 1979, pp.37-44.

Table: 7 Projected Growth Rates of Macro Variables for the  
Perspective Plan Period: 1985-2000

(at 1984-85 prices)

Variable	Unit	1984-85	1989-90	1999-2000
1. GDP at Factor Cost	Rs. crores	193428	246881	402143
2. GDP Growth Rate	Percent	-	5	5
3. Per capita GDP	Rupees	2616	3027	4163
4. Per capita consumption expenditure	Rupees	1979	2271	3124
5. Saving-GDP ratio	Percent	23.3	24.5	25.8
6. Investment - GDP ratio	Percent	24.5	25.9	26.4
7. Food Grains	Million tonnes	150	178 to 183	235 to 240
8. Population below poverty line	Percent	37	26	5
9. Employment	Million standard person years.	187	227	318

Source: Planning Commission, Government of India, Seventh Five  
Year Plan, 1985-90, Vol. I, New Delhi, 1985, pp. 8-22.



Table 2: Projected Growth Rates of GDP in the ISL's Perspective Plan 1973-74 to 1988-89.

(at 1973-74 prices)

Sector	Growth Rate	Composition of GDP		Investment Rate
		1973-74	1988-89	
1. Primary Sector	5 to 5.5	60	45.48	19.9
2. Secondary Sector	10 to 12	13	22.61	22.8
3. Tertiary Sector	8 to 9	27	31.91	28.5
Total GDP	<sup>c</sup> 7.3			<sup>b</sup> 27.3

Notes: (a) Average saving rate estimated was 22.3.

(b) Average investment rate estimated for the entire period.

(c) The perspective plan also suggested alternative growth rates of GDP phased over three Five Year Plans, viz., 6.5% during the Fifth Plan period, 7.5% during the Sixth Plan period and 7.9% during the Seventh Plan period.

Source: V.K.R.V.Rao, Planning in Perspective, Allied Publishers, New Delhi, 1978 Ch.1.

Table 10: Targets of Growth Rates, Investment and Employment Projected  
Under Feasible Growth Rate with Moderate Effort

(at 1974-75 prices)

Sector	Projected Compound Growth Rate %			Investment (Rs. crores)		Estimated Employment Generation (000's) 1987-88
	1968-69 to 1975-76	1977-78 to 1982-83	1982-83 to 1987-88	1978-79 to 1982-83	1983-84 to 1987-88	
1. Agriculture and allied activities, mining and quarrying.	5.7	6.0	6.3	1340 (36.6)	1986 (31.7)	952.9 (62.2%)
2. Factory Establishments and utilities.	6.0	9.8	10.9	780 (21.3)	1533 (24.5)	8.8 (5.88)
3. Small Enterprises and Construction	4.9	11.0	13.8	88 (2.4)	167 (2.7)	1455 (9.5)
4. Commerce, Transport and Communications	4.5	7.7	10.4	643 (17.3)	1256 (20.0)	1807 (11.8)
5. Others	3.2	8.2	9.3	808 (22.1)	1324 (21.1)	1648 (10.7)
Total	5.0	7.0	8.1	3659 (100)	6266 (100)	15327 (100)

Notes: (a) The overall marginal capital output ratio assumed is 2.83 for 1978-79 to 1982-83 and 2.93 for 1983-84 to 1987-88.

(b) The estimated investment rates are 18.4 and 21.9 respectively.



Table:11 Targets of Growth Rates, Investment and Employment Projected  
Under Feasible Growth with Greater Effort.

Sector	(at 1974-75 prices)			Investment (Rs. crores)	Estimated Employment Generation (000's) 1987-88	
	Compound Growth Rate %		1978-79 to 1982-83			
	1968-69 to 1975-76	1977-78 to 1982-83	1982-83 to 1987-88	1978-79 to 1982-83	1983-84 to 1987-88	
1. Agriculture and allied activities, mining and quarrying.	5.7	4.9	5.4	1079 (27.6)	1596 (25.0)	8693 (57.2)
2. Factory Establishments and utilities	6.0	10.8	12.1	884 (22.6)	1813 (28.4)	980 (6.4)
3. Small Enterprises and Construction.	4.9	13.1	16.6	109 (2.8)	235 (3.7)	1810 (11.9)
4. Commerce, Transport and Communications.	4.5	9.8	10.0	853 (21.8)	1319 (20.6)	1953 (12.3)
5. Others	3.2	9.6	9.4	982 (25.1)	1430 (22.4)	1769 (11.6)
Total	5.0	7.0	9.1	3907	6393	15205

Notes: (a) Assumed incremental capital output ratios are 3.02 and 2.59 respectively.  
(b) Assumed :

Notes: (a) Assumed incremental capital output ratios are 3.02 and 2.59 respectively.

(b) Assumed investment rates are 19.8% and 22.4% respectively.

Source: Perspective Planning Unit, Planning Department, Macro Perspective For Karnataka: 1978 to 1988 Bangalore, January 1978.

Table 12: Targets of Growth Rates, Investment and Employment Projected Under Feasible Growth with Maximum Effort.

(at 1974-75 prices)

Sector	Compound Growth Rate %				Investment (Rs. crores)	Estimated Employment Generation (000's)
	1968-69 to 1975-76	1977-78 to 1982-83	1982-83 to 1987-88	1982-83 to 1987-88	1978-79 to 1982-83	1983-84 to 1987-88
1. Agriculture and allied activities, mining and quarrying.	5.7	5.4	6.3		119 (28.6)	1308 (25.5) 8961 (58.3)
2. Factory Establishments and utilities.	6.0	11.3	13.1		930 (22.2)	1995 (28.1) 946 (6.2)
3. Small Enterprises and Construction.	4.9	13.5	17.7		113 (2.7)	256 (3.6) 1703 (11.1)
4. Commerce, Transport and Communications.	4.5	10.3	10.9		907 (21.6)	1454 (20.5) 1940 (12.6)
5. Others.	3.2	10.1	10.2		1041 (24.8)	1575 (22.2) 1871 (11.8)
Total	5.0	7.5	9.0		4190	7088 15367

Note: (a) Assumed incremental capital output ratios are 2.99 and 2.85 respectively.

(b) Assumed investment rates are 20.9 and 23.4 respectively.

Source: Planning Department, Perspective Planning Unit, Macro Perspective For Karnataka: 1978 to 1988, Bangalore January 1978.



Table 13: Projected Growth Rates of Macro Variables by Perspectives of Karnataka's  
Development 2005 A.D.

(at 1980-81 prices)

Sectoral SDP	Growth Rate %		% Composition		Estimated Work For (percent)	
	1994-95 over base period	2004-05 over 1994-95	1994-95 over base period	2004-05 over 1994-95	1994-95	2004-05
1. Agriculture and allied activities.	4.5	4.8	49.77	48.63	68.39	67.39
2. Manufacturing other than house hold industries.	4.6	5.1	9.00	10.06	6.52	6.52
3. House hold industries	7.2	7.4	2.30	2.68	3.75	3.75
4. Tertiary activities construction and activities.	5.4	6.1	38.10	39.23	21.35	22.35
Total SDP	5.0	5.5	100	100	100	100

Source: Perspective Planning Division, Planning Department, Government of Karnataka,  
Perspective of Development: Karnataka 2005 A.D., Bangalore, April 1982, pp.36-43

DEVELOPMENT OF DRY AREAS AND IMPRESSIONISTIC ACCOUNT OF THE STRENGTHS  
AND THE WEAKNESSES TOGETHER WITH ALTERNATIVES FOR ACTION

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STRENGTHS

1. There are few programmes in the country which can claim to have achieved the distinction of reducing the unit cost of various activities in infrastructural development with the passage of time. With the help of new technology an effort has been made in this project to achieve precisely this objective.

2. There is a tendency in the bureaucratic system to use time bound projects for generating bureaucratic structures that have to be maintained in perpetuity. The project organizers on the contrary have sought to reduce the establishment cost. The implication therefore is that same or even more amount of work would be done by lesser number of people and even sanctioned positions may not be filled up. There could not be a better example of de-bureaucratisation. It is well known that with the increase in organizational staff the time spent on intra-organizational coordination is more than the time spent on inter-organisational and organization and people co-ordination. This is an experience which needs to be carefully monitored and analysed.

3. I visited one very good and one below average water shed. It was undoubtedly a contrast not merely in terms of technical quality of

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1) This is with reference to the attempt of trying biological bunding.



works but also in terms of morale and motivation of the members of Water Shed Development Team. In Chittravathi Water Shed Project motivation level could be gauged from a remark of the scientist member of the team who was visibly very upset when he learnt that there was another project which had a few features better than their project. The competitive spirit and ability to learn from other's mistakes as well as innovations was quite apparent. I learnt that the Project Director and Agro Economist had generated a very healthy competitive spirit amongst various water shed teams. Prizes had been instituted for various activities. The use of persuasive power for getting problems solved rather than using authority for this purpose was recalled by many people I met during this trip.

4. I am avoiding discussion on the technical aspects of the Water Shed in this note. Not that they are not important but the institutional and the social aspect sometime can make or mar the effect of any technology howsoever sound it may be.

#### CREDIT

(a) In the first year when the farmers were advised to borrow loan for the 25% of the cost of kind component (75% was subsidy) many of them were hesitant, some because they were ineligible because of previous defaults and some because they were not sure whether borrowing was justified in view of the risks. Bending the rules project organization went ahead and provided the inputs with 100% subsidy in the first year. The understanding was that if they get surplus income the farmers would pay back the old dues and borrow in the next season from the Banks. This is perhaps precisely what happened. Farmers initially paid back the dues, but also took loans from the Banks which again were very promptly paid back. This is an issue again deserving a very careful analysis because even in irrigated projects where State is investing huge funds directly or indirectly the recoveries have been persistently low<sup>2</sup>.

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2. Several other approaches have been tried in this regard by CRIDA, Hyderabad and other institutes; see Gupta Anil K, 1988, Role of Credit in Diffusion of Dryland Technology, CMA, IIM, Ahmedabad, mimeo.

(b) If survival of plants in the Government land is an indication of the supply of restraint by the people who had been grazing their animals in these regions then one could assume that considerable cooperation was received from the people in this regard. However, I would come back to the issue of willingness of the people who have benefited enormously through water storage or checking of erosion or recharge to share either the cost of future maintenance of investments or to share the benefits with less fortunate members of the village community such as landless pastoralists.

(c) One of the basic problems in the Water Shed Project has been the unwillingness of farmers to align their field bunds or to allow water drainage channels to pass through their field for various reasons. In this regard the project achieved perhaps considerable success by way of cooperation of the farmers in allowing the water courses to pass through their field if necessary. Although the field bunds were retained as such the farmers did follow contour ploughing and in many cases paired row technology.

(d) Finally, the support from the top, i.e., Project Director as well as Senior Scientist (Agriculture economist on loan from Dharwar Agriculture University) has played a very distinct role in encouraging people to not merely innovate but also to take pride in deviating from the norms. This is again something which is not most commonly found.

#### AREAS OF IMPROVEMENT AND ALTERNATIVES FOR ACTION

1. It is true that in most developmental programmes Government may not succeed in redistributing income particularly if the infrastructure created is a public good. Even in this case where the infrastructure is a common good there has not been much effort in generating institutions that can cross subsidise the poor by the rich (who may have gained for historical and other reasons more from the State investments). In this regard, the Project Director and leaders of other departmental programmes of similar nature would have to give urgent attention to the following issues:

(a) Whether the Village Level Departmental Committee (in this case Water Shed Committee) is being helped to evolve norms and conventions for both the maintenance of the existing structures and for meeting the cost of new structures as



and when it may become necessary.

- (b) Whether any consciousness has been developed with regard to generating a sort of reserve fund or risk fund which can be used to compensate in the short term those people who have borne the cost of project development. For instance, the landless livestock owners would obviously have to bear greater cost in the short run. The development of Government land as well as private waste land could take place largely because the landless and other livestock owners contributed restraint, i.e., did not continue with the grazing of their livestock on these lands.
- (c) What are the mechanisms of sharing direct and indirect benefits which would accrue only after a period of time? How would those benefits which have already accrued be shared with these people or other marginal land holders. For example, through gully checks and other conservation in the catchment good amount of water has been conserved. With better recharge the ground water table has risen thereby improving the efficiency of those who had wells or who can invest in new wells. In one case when a farmer who benefited in this manner was asked at what rate he would sell the water so obtained through public investments he replied that he would charge 1/3 of the crop of the buyer. As an Economist would demonstrate, this is a far higher share than what the marginal cost benefit calculations would justify. One might argue that Scientists and Project Authorities cannot take responsibility for bringing out a basic social change given the political economy of the State. One might also argue that even in irrigation projects there have been problems of unequal distribution of resources and none has really bothered much about that. If such a thing is happening in a Water Shed projects also does one need to bother? One has to appreciate that the leverage that water shed teams have with farmers is enormous, because of the results that they have shown in the short term. Can they influence evolution of norms in this regard? We must admit that given the extraordinary pressure of work existing, scientists cannot be expected to take care of all the problems.
- (d) It is obvious that when project would be wound up after two or three years assets would be handed over to the Mandal Panchayats or some other such bodies. What degree of the managerial preparedness is being created in these Panchayats to sustain the infrastructure so created? To what extent would these panchayaths be able to charge some cess from those who have benefitted to repair the breach which may take place in the bunds, replace the saplings which may die on the Government land or desilt the bunds which may get silted up or any other such problem.

2. What are the alternatives in terms of the social institution building which help take care of some of the above concerns?

- a) To recognise that many good projects have decayed once the management support was withdrawn (as is the intention in each watershed project). The social institutions do not have to follow technological change but have to be brought about simultaneously.
- b) The technical scientists can contribute in this process but cannot be entirely responsible because they are already overburdened. They have to be provided support of the social scientists/voluntary organisations at the apex (i.e. DLDB/ Universities) level as well as the level of the watershed. Although, I do not underestimate the ability of the technical scientists to do this, I do feel that before a new responsibility is added, their existing burden will have to be reduced.
- (c) The major resources that have been built through public investment of time and resources in water shed projects are:
  - additional water in farm ponds, dams or wells through recharge
  - horticultural and other trees which would start bearing outputs 3-5 years hence.
  - silt deposited in some structures being used as manure by farmers
  - reclaimed land due to checked erosion or nullah bunding
  - fodder through grass/tree leaves etc.
  - other grasses of economic importance to broom makers, medicinal plants.
  - agave (amenable to processing ref: an excellent organizational innovation at Ungra. The idea in nutshell was the poor who plant agave on waterlands/government lands would forego part of their



wages and buy from the saving so made equity of a value adding firm to be established by professionals for processing agave. The issue can be discussed in detail later but idea is too important to be ignored.)

The issues are:

How does one organize institutional arrangements for distribution of these resources among various losers and gainers of the project. Who should have what right on which resource augmented through investments by state and the landless livestock men/pastoralists.

Will this distribution take place automatically, if not, how can stakes of poor be built into the system; rich have gained and will continue to gain if catchment continues to be good. Will they let poor have preemptory rights on trees in the catchment? A colleague mentioned the possibility that the silt could be used for tiles, could potters be given first right to this silt? A whole range of questions arise in this regard which are solvable and must therefore be resolved through negotiations amongst rich and poor. Will this process of negotiation not strengthen even the Mandal/Village Panchayats?

The management of commons is then a key challenge and colleagues at IISc. (Drs. Madhav Gadgil, AKN Reddy, Ramachandra Guha) at IIM (NV Ratnam, Vinod Vyasulu and others) at DLDB (Sastri, Kedar, Subramanian); Dr. Hegde, Rao (at UAS) etc. may really have better alternatives.

3. One of the important concerns I have regarding young and energetic officers drawn from Forest, Agriculture and other

departments is about their fate after they revert to their parent departments. I hear that some of them are not receiving adequate appreciation from their bosses in the line departments. Perhaps by setting standards of excellence at low cost, they have generated a pressure on the standards of performance in parent departments. I suggest that some sympathetic senior officers in each of the line department must be located and suggested to visit these projects. This may help in a subtle way. These young and dynamic officers atleast will get noted. Who knows this process may help them in the long stead. This is really an important issue and cannot be delayed at all.

4. Value Addition: Several resources generated through watershed development can generate far more returns than possible in the present arrangement. The experience of Ungra project needs to be drawn upon very carefully and in substantive details. The single most important lesson of the project was that landless people would not only provide labour by way of planting agave on the government or forest wastelands but also buy equity (as mentioned in point 2(c) above) of the value adding firm to be established for processing Agave. Two modifications may be useful in that design.

a) Managerial skills may also be provided to the local people participating in these projects depending upon their attitude so that unlike Amul project the employment opportunities generated through this investment are not appropriated entirely or mainly by the people from outside.

b) To ensure accountability and efficiency rigorous accounting system needs to be established even for goods and services which may be generally speaking non-tradeable. In other words the externalities of investment need to be properly accounted so that the beneficiaries direct or indirect become adequately accountable to each other.



The value addition could be considered in the context of the other such products e.g. Khus, fruit, trees non-edible oil seed derived from trees etc. The concept of agro-industrial watershed developed by Mr.J.S. Bali, former Joint Commissioner, Soil Conservation may be properly adapted for the purpose. I am sure that soil and water conservation without linking them with the industrial harnessing of energy may not in the long run generate sufficient interest among the people. Given the nature of problem in this state, mobilisation of people for involvement in such programme cannot be neglected. It will also be useful to try to mould some of the environmental movement in the state in this direction so that popular support generated in the wake of this movement could be channelised in planting and maintaining grasses, shrubs and seedlings as per the water-shed concept.

5. I had very interesting discussion with Dr.Hegde and the Vice Chancellor of UAS. It is admitted that not many post graduate students in the university are pursuing their research aimed at solving the problems of drylands. This should concern the P.P Committee as an urgent issue. Unless the supply of skill is organised today for solving the problems of tomorrow, what will sustain the hope of a better future?

How can state government make dry farming research attractive for the post graduate students?

How can the scientists working on dryland problems be provided a better working environment? How can the faculty of Agri-engg, Animal Husbandry and other departments (including the

social science ones) be involved in dry land development are some issues which need to be urgently looked into.

6. Action at our end: I have mentioned in my initial discussion with Shri L C Jain I was hesitant to accept the invitation only because I was worried whether I would be able to take upon any additional responsibilities given my prior commitments (should such a contingency arise). However, after visiting the project and looking at the enthusiasm of the colleague professionals from different departments and research institutions I have no hesitation in saying that this effort deserves urgent and utmost professional assistance. It is quite likely that much of the support that is needed and that is suggested in this note can be easily mobilised from Bangalore or other institutions within Karnataka. In that case our role is merely facilitative. At best we could contribute ideas and probably document some of the experiences.

However, in case Karnataka Government would like us to go beyond just documentation we would be able to constitute a small team of colleagues who could make an analytical documentation of the DLDB model of watershed development and perhaps suggest some direction in which credit and other institutional aspects of the project could be strengthened.

I also strongly suggest that Mr. Kedar who was earlier Director, DLDB may be relieved for a fortnight to spend time with us so that we could initiate the process of documentation within next month. This could be done irrespective of any other follow



up that may or may not be required.

I conclude by saying that apart from involving the plant scientists, the professionals from other related developments, like animal husbandry and industry could be easily involved to generate far more return on investment than is actually being obtained.

I express my sincerest thanks for this opportunity to visit the dryland project. The excellent hospitality provided by Ms. Vatsala Watsa, Mr. Subramanian, Director, DLDB and Dr. Shastri (DLDB) is gratefully acknowledged. Help of Mr. Balaji (Secretary to Ms. Watsa) and PA to Mr. Jairaj (M.D. Apex Coop. Bank) who helped in taking dictation and typing the first draft of the notes is highly appreciated.

# PLAN TECHNIQUES AND DEVELOPMENT PERSPECTIVES

## RETROSPECTION AND PROSPECTION

Gladys Sumithra

Planning at the national level has attained certain degree of sophistication, enabling formulation of strategies, programmes and policies within the broad framework of consistency and feasibility. However, state level planning in Karnataka is yet to go a long way in providing such solutions. But, to the extent that some of the state plan targets - more specifically, for key activities - get scrutinised and altered based on the national level solutions, national level techniques do enter state level plan process, may be through the back door. Hence, the need to evaluate the dynamics of the plan process in its totality.

Plan formulation has crucial stages which are depicted in Fig.1. Our focus here will be on the first three steps, viz., goals, techniques and strategy. Have the strategies emerging from the plan techniques resulted in realising the set goals?

### Welfare Plans

Ever since the initiation of development process through planning, welfare has been the goal, both at national and state levels. Conceptually, this goal has taken different nomenclatures / descriptive content. In the First Five Year Plan, while economic development was defined as building of an efficient apparatus for production of material goods, social complexion took the content of provision of social services, and widening of opportunities for the common man and social equality and justice.. The Plan intended to



create conditions in which living standards are reasonably high, and all are given full and equal opportunity for growth and service. In the subsequent Plans, welfare goal has been spelt out in terms of removal of poverty; food, work and productivity; and growth, equity and self-reliance. In short, both National and State Plans have intended to be Welfare Plans.

#### Welfare Dynamics in Planning

Functional relationships between welfare as the goal and the crucial determinants have undergone a process of evolution in planning. Initially, welfare was treated as a function of overall growth, that is, the growth of national/state income; the assumption implied was that a certain growth rate was needed to secure a progressive rise in the level of consumption per head. Subsequently, welfare was considered as a function of magnitude as well as structure of national/state income, the structure being defined in terms of highly aggregate sectors like consumption goods sector and capital goods sector (the perspectives which were drawn up for the thirty years between 1950-51 to 1980-81) or the division into primary, secondary and tertiary sectors (the perspectives which were drawn up for the Sixth and Seventh Five Year Plans in Karnataka). These highly aggregate sectors were sub-divided to analyse the implications of scale of activity, level of technology (like small scale/household industries versus factory sector). The structural content got expanded with the introduction of another determinant of welfare, namely, structure of employment; more specifically, shift in work force from agricultural to non-agricultural sectors. During 1970s and 1980s, at the national level, efforts were made to introduce disaggregation of

sectors with the help of 66x66 input-output table which got further disaggregated as the data-base improved. Another departure in the welfare plan which has become an appendage to these functional relationships is the introduction of regional and demographic dimensions into the solutions to the problem of poverty; till very recently, these dimensions were outside the main Plan model framework. Consistency and feasibility solutions which have emerged through the application of input-output techniques and material balances approach at the national level have presumed that welfare goal can be achieved through supply-demand balances at the sectoral levels considered in determining the levels of output. Fig.2 depicts the relationships assumed in the Plan model frame adopted in the formulation of the national Sixth and Seventh Plans. Inputs into the model, outputs in the form of solutions and linkages among the models are depicted in this structure. There are three core models and seven sub-models. The core models generate consistent set of output levels and indicate investment requirements by origin and destination. The sub-models are intended to serve various purposes such as:

- (i) to provide data base for the core models;
- (ii) to assist in component analysis;
- (iii) to capture details of certain phenomena that are complementary to the input-output model;
- (iv) to handle certain variables which get excluded in the core model / which get highly aggregated; and
- (v) to examine feasibility of the solutions arising from the core models.

While the sub-models have facilitated analysis at a further level of disaggregation in sectors like agriculture and industry and in capturing income distribution process in poverty analysis and their implications in the demand analysis, the techniques adopted have



focussed on production levels and investment requirements to attain the same as sufficient condition of realising the welfare goal.

In short, the welfare cycle assumed in plan formulation (despite sophisticated planning techniques adopted at the national level) is :

Income---"Generation of financial resources---"Investment  
Production---"Welfare. Income redistribution is introduced in  
computation of desired income level, feasible savings and investment  
and some of the final demand targets which have determined output  
levels consistent with intermediate and final demand.

#### Welfare Cycle : An Empirical Analysis of Selected Sectors in Karnataka

A more realistic welfare cycle is one which covers all the linkages before and after the production point with the welfare goal. Such a cycle can be depicted as follows:

Effort (financial and physical resources and their deployment)---"  
Asset creation/input augmentation---"Resource utilisation---"  
Production---"Accrual of income and distribution of goods and  
services---"Welfare.

Since the beginning of planning in Karnataka, major share of plan effort has been on power, irrigation, social and community services and agriculture. These four sectors have accounted for more than 80% of Plan expenditure during the three decades from 1956 to 1985. Table 1. presents the same. An attempt is made to quantify the various components of the welfare cycle in the context of the four sectors which have accounted for the major share of the Plan effort. Tables 2 to 4 present the same.

In the context of agriculture and the related infrastructure, namely, irrigation ( Table 2 ), linkages in the welfare cycle appear to have got disconnected immediately after asset creation/input augmentation. The strategy of structural shift in income and employment through irrigation and intensive cultivation in agriculture and thrust on small-scale and household industries has not operated in the expected manner as can be seen from the ratios. On the other hand, in the power sector, linkages are missed after the production point ( Table 3 ). In the social and community services, situation appears to be one where the linkages are missed at different points in the cycle ( Table 4 ). On the whole, despite Plan efforts for nearly four decades, the State faces problems of malnutrition, high infant mortality rate, high rate of illiteracy, low levels of productivity, large expansion of labour force in the context of relatively lower growth of employment opportunities - problems which have significant quantitative dimensions as can be seen from the data presented in the Tables. As against the number of main workers at 136.30 lakhs in 1981 and expansion of employment opportunities by about 37 lakhs during the two decades ending in 1981, labour force for whom employment opportunities are to be provided is expected to be around 218 lakhs; an expansion by 81 lakhs during the two decades ending in the year 2001.

#### Needed Departures in Plan Formulation

Experience has established the need for reexamining welfare dynamics in plan formulation. Even though input-output technique has certain powerful facilities, given the sectoral aggregation which is



adopted, due to data inadequacies and the assumption of constancy of technological coefficients, the technique by itself cannot deal with strategies which complete the welfare cycle. Input-output solution gives rise to demand - determined targets and hence the planning exercise has utility in terms of supply management rather than demand management. Further, the input-output coefficients and employment implications are accepted as a matter of destiny and not of choice. Heavy plan investment sector like irrigation gets concealed in a broad sector like construction and the model cannot capture the implications of such investment. However, the technique is not without its utility, provided sufficient care is taken to introduce necessary details and go beyond the technique where needed. The technique can help in identifying critical sectors, activities which use scarce resources intensively and thereby point to sectors where technological coefficients need to be altered, areas which provide scope for demand management and critical inputs in welfare programmes (all commodity details are worked out outside the input-output table through material balances).

One major departure needed in plan formulation is to give up the conventional obsession with the macro variables like income, saving and investment as the initial target variables. It is necessary to begin with appropriate welfare indicators such as infant mortality rate, life expectancy, literacy, etc. as well as targets for the same, identify such of the variables which determine welfare directly and work backwards in terms of production requirements, corresponding input requirements and plan effort needed to meet the same. Income implications can be an appendage to this. In these dynamics,

sufficient care is to be taken to capture the pre-requisites for realising the desired accruals in terms of income and goods and services. In short, the plan formulation has to be so modified that all the links in the welfare cycle are captured with due recognition to the fact that the welfare goal is a function of effort in both public and private sectors and plan effort is only a component of this.

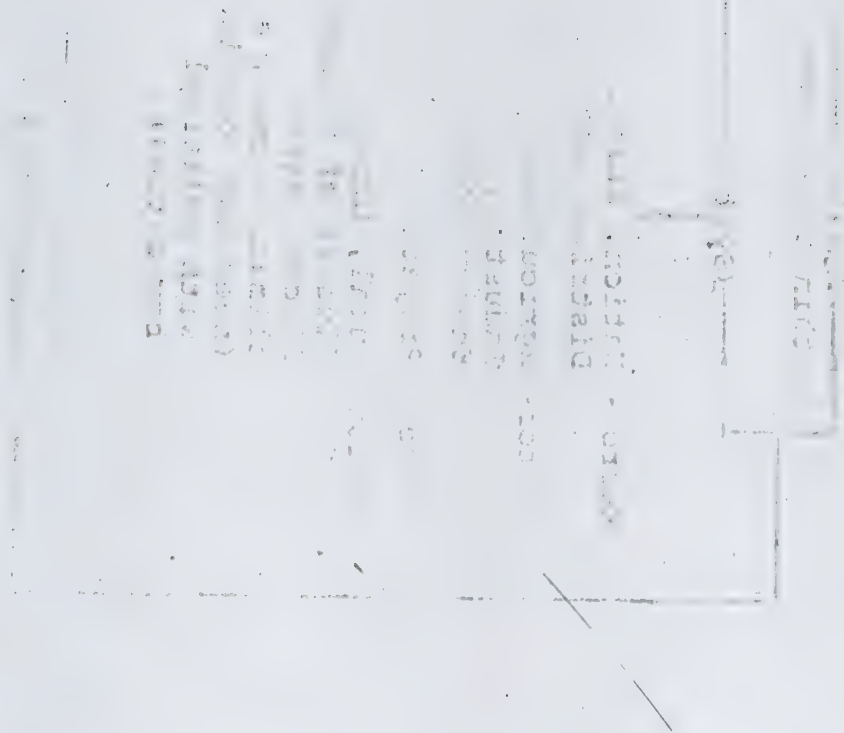




Fig.1

Plan Formulation

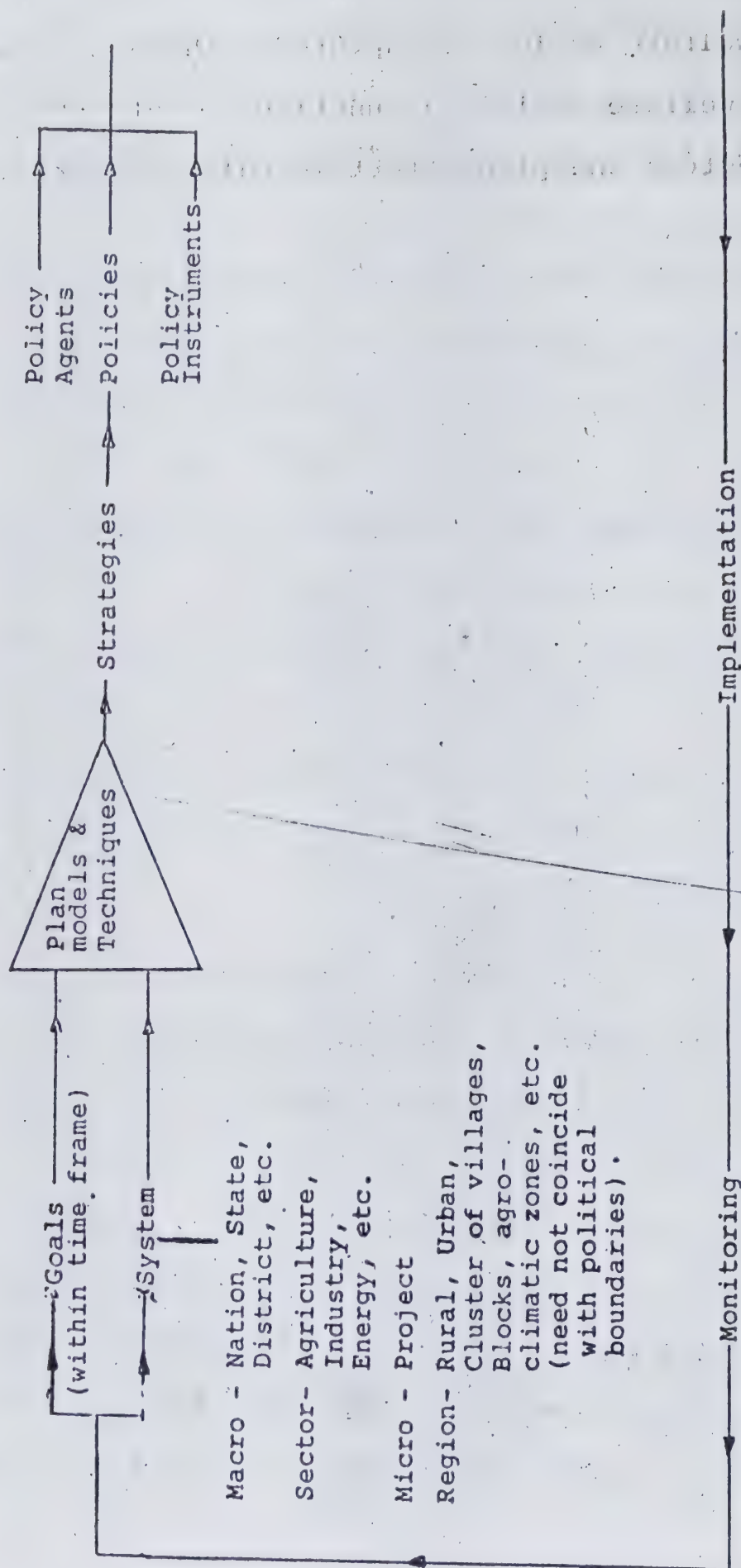


FIG-2

SIXTH AND SEVENTH PLANS OF INDIA  
MODEL FRAMEWORK

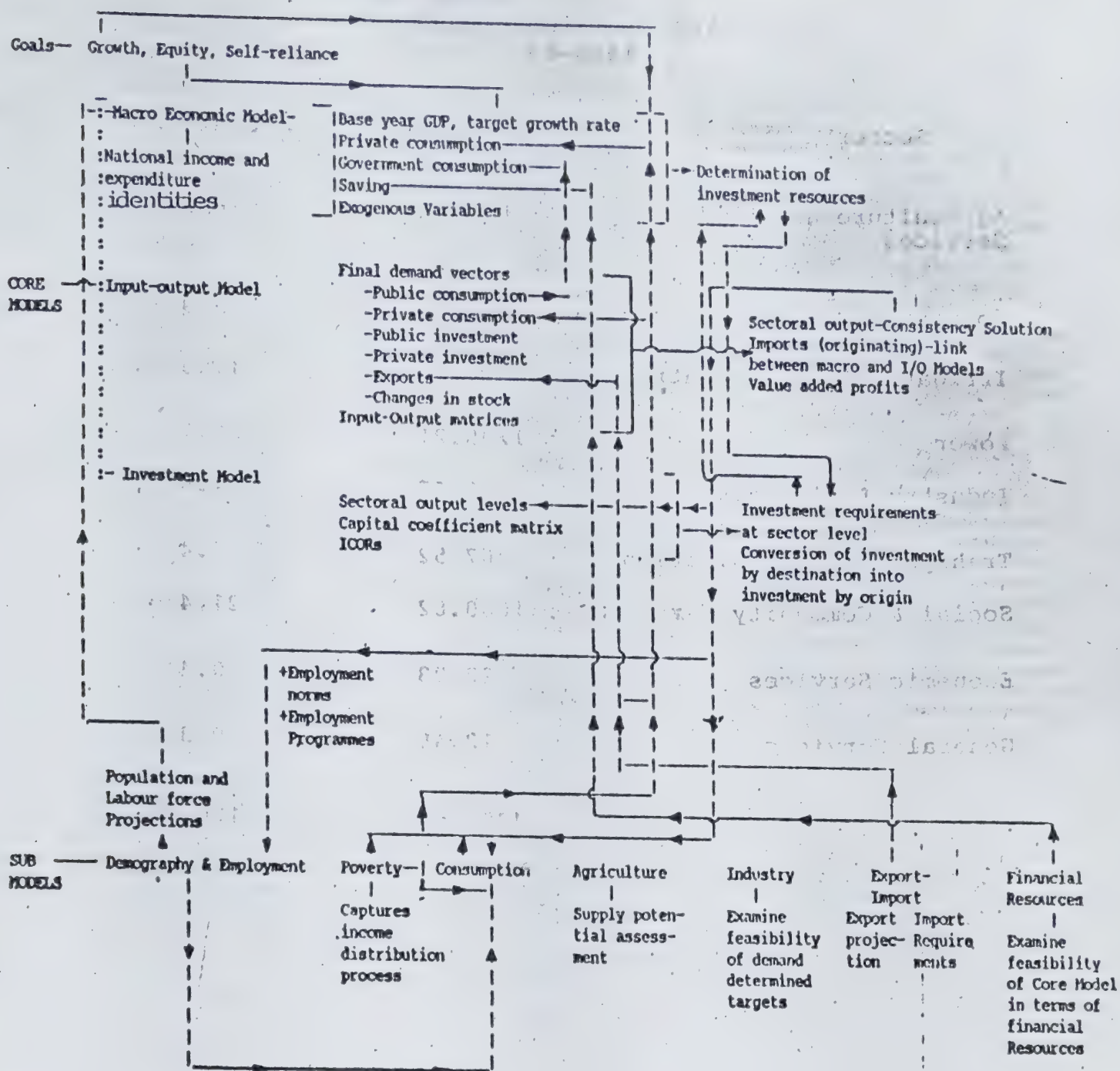




Table 1  
STATE PLAN EXPENDITURE  
1956-85

Sector	Amount (Rs.)	Share (%)
Agriculture & Allied Services	800.42	16.2
Cooperation	143.19	2.9
Irrigation & Food Control	868.35	17.5
Power	1295.21	26.1
Industry & Minerals	388.67	7.8
Transport & Communication	367.52	7.4
Social & Community Services	1060.62	21.4
Economic Services	22.08	0.4
General Services	12.48	0.3
TOTAL	4958.54	100

Welfare Cycle : Agriculture

Effort Rs. Crores	Asset Creation Input Augmentation	Asset Utilisation	Production	Distribution	Accrual
Plan Expenditure 1956-85: Agriculture & Allied Services 800.42 Irrigation incl. projects pending approval 1373.58	Irrigation: Area covered till 1985-86 in 1000 hect. Major & Medium 1317.0 Minor 1164.0 Area covered as proportion of potential Major & Medium 53% Minor 55% Overall 54% Net Irrigated Area in 1000 hect. 1961-62 1983-84 920.0 1590.0 Net Irrigated Area as proportion of net cropped area (%) 1961-62 1983-84 9.0 15.0 Fertilizer in lakh tonnes: 1970-71 1985-86 1.5 5.6 Area under HYV in lakh hect.: 1970-71 1985-86 5.3 27.5 Energisation: IP sets energised in thousands 1960-61 1985-86 16.9 515.2 Diesel pumpsets in thousands 1960-61 1984-85 10.0 58.0	Irrigated area utilised as p.p.n. of created 1983-84 Net 68% Gross 83.5%	State Dom. Prod. in Rs. Crores: at current prices 1970-71 1985-86 1016 3513 55% 38% at 1970-71 prices 1970-71 1985-86 1016 1280 55% 41% SDP from Agri. as p.p.n. of total SDP are given as % Index : Triennium ending 1969-70 = 100 1970-71 1985-86 Area 103.4 100.8 Production 115.0 144.0 Yield 94.7 125.1 All India Aver=100 1970-73 1982-85 per hect.agri.inc. 85 85 Production in lakh tonnes : 1970-71 1985-86 Cereals 52 64 Pulses 5 5 Oilseeds 9 10 Sugarcane 81 138 Cotton in lakh bales 6 5 Yield (kgs/hect): 1970-71 1985-86 Rice 1798 1866 Ragi 891 1139 Jowar 740 669 Maize 3494 2303 Tur 528 451 Groundnut 799 735 Cotton (lint) 95 146 Sugarcane (tonnes) 81 85	Malnourishment : RURAL (N.S.S.) 1983 No. of individuals covered: 17242 No. malnourished: 11508 Poverty line: 1971-72 1983 Rs. 37.34 113.85 % below the Poverty line: 1971-72 1983 64% 66.7% VII Plan est.: % below the Poverty line: 61% (Rs.108) URDAN (N.S.S.) 1983 No. of individuals covered: 12295 No. malnourished: 10112 Poverty line: 1971-72 1983 Rs. 68.80 176.65 % below the Poverty line: 1973-72 1983 81% 82.2% VII Plan est.: % below the Poverty line: 58% (Rs.130) STATE (N.S.S.) No. of individuals covered: 29537 No. malnourished: 21620 % below the Poverty line: 60% (Rs.73.20) Gini coefficient of consumption exp.: 1963-64 1983 Rural 0.29 0.28 Urban 0.34 0.31 Total 0.30 0.30 Mean monthly per cap. expenditure on food (Rs.) 1983 Decile Rural Urban 0-10 35 39 90-100 119 157	Income/worker Rs. at 1970-71 prices: 1970-71 1984-85 Karnataka 1397 1366 India 1307 1390 Punjab 3366 4988 Per capita income: Rural Rs. (based on cropped area & per hectare output) 1982-85 Karnataka 1074 India 934 Punjab 2325 Minimum wage-rate Rs./day : w.e.f. 31/1/85 Karnataka 9.50 to 14.00 Est. per capita monthly income, assuming 2 earning members/family & 200 working days p.a. Rs.69.00 Pov. line = 113.85



Effort Rs. Crores	Asset Creation Input Augmentation	Asset Utilisation	Production (Generation)	Distribution	Accrual
* Plan Expenditure Power 1956-85 1295	Installed Capacity (MW) 1960-61 : 186 1986-87 : 2530 Hydel Potential: 4870 Exploited: 2082 (March 87) (43%) Rural Electricity Proportion of electrified villages (%) March end 1972 1987 38 96	Load factor: 1970-71 62.9% 1985-86 34.3% MW/MU ratio: 1970-71 0.182 1985-86 0.333 T&D losses: 1970-71 13.9% 1985-86 22.8%	Energy Generation (Mus.) 1960-61 : 1093 1986-87 : 7596	Per capita Consumption of Electricity (Kwh) 1970-71 : 104 1985-86 : 184 (Punjab, corresponding figs. are 159 & 422 and all India average is 90 & 176) Domestic : Per capita Electricity consumption (Kwh) Karnataka Punjab India 1960-61 3.2 6.3 3.4 1970-71 7.9 10.3 7.1 1985-86 39.2 50.0 25.0 Agriculture : Per capita Electricity consumption (Kwh) Karnataka Punjab India 1960-61 1.2 6.7 1.9 1970-71 6.2 34.7 8.3 1985-86 33.2 165.2 34.3	Income/worker at 1970-71 prices (Rs.): Unregistered industries: Karnataka 1970-71 1980-81 1767 1453 Non-agricultural Activities: Mining & manufacturing Karnataka 3452 4562 India 3522 4223 Maharashtra 4908 6446 Services Karnataka 2429 3518 India 3451 5679 Gujarat 4264 6145

Welfare Cycle : Services

Effort Rs. Crores	Asset Creation	Infrastructure Level	Impact
Plan Expenditure . 1956-85 Services 1428.14	Rural Health Services Centres - Mar'86 5423 Hospitals & dispensaries - Mar'86 1792 Rural Water Supply Problem villages as on 1/4/80 15456 Problem villages covered during 1980-85 15443 Road Length (Km.) 1974-75 97955 1981-82 112793	Health: Rural Centres/ lakh population as in Mar'86 Karnataka 20.5 India 18.7 Gujarat 25.8 Potable Water Supply: as on 1/4/85 Proportion of popn. covered Rural Karnataka 82.9% India 56.2% Urban Karnataka 81.2% India 72.9% Sanitation: as on 1/4/85 Proportion of popn. covered Rural Karnataka 0.2% India 0.7% Gujarat 3.7% Urban Karnataka 38.4 India 28.4 Punjab 48.5% CMIE Index India=100 1966-67 '76-77 '85-86 90 105 100 Punjab 201 216 218 Proportion of villages non-accessible by all-weather roads: (March '84) Karnataka 70% India 70% Punjab 1%	Infant mortality rate: (per 1000 live births) Rural 1976 1985 Karnataka 99 80 India 139 105 Kerala 58 32 Urban 1976 1985 Karnataka 60 41 India 80 57 Kerala 47 30 Birth rate: Rural (per 1000 persons) 1971-73 1981-83 Karnataka 32.3 29.3 All-India 37.7 35.5 Kerala 30.7 25.8 Death rate: Rural (per 1000 persons) 1971-73 1981-83 Karnataka 14.2 10.3 All-India 17.4 13.3 Kerala 9.1 6.7 Effective literacy rate (%) Males 1961 1981 Karnataka 42 49 All-India 40 47 Kerala 65 75 Females 1961 1981 Karnataka 17 28 All-India 15 25 Kerala 46 66 Proportion of illiterate adults (%): (15 years & above) 1981 Males Females Karnataka 43.1 71.8 All-India 45.2 74.3 Kerala 14.0 29.2 Housing Shortage: 1985 (in thousands) Rural 883 Urban 527 (Average of 38/1000)



## 1. Introduction

The purpose of this study is to depict the educational scenario in Karnataka state by the year 2001 AD on the basis of a review of past performance and present trends. The scenario will take into account the educational needs of the state in regard to quantitative expansion as well as qualitative improvement. The context of analysis of the past trends will be the Constitution of India which symbolises the hopes and aspirations of the people. The extent to which education has been a chief instrument in the realisation of the values enshrined in our Constitution, the role that education has so far demonstratively played and the factors which need to be regulated in future for redefining the role of education and rendering it effective, the changes that education has to undergo from within its structure, organisation and content in relation to the overall goals of the nation will provide the backdrop for this study.

Illiteracy is one of the seven social sins identified by Mahatma Gandhiji. Promotion of illiteracy or even lack of positive social action to prevent the growth of illiteracy by an elected, responsible government is an unforgivable social sin. The success of a democracy depends upon the quality of its citizens. Proper education makes the citizens enlightened and effective participants in the democratic process of nation-building in India. In a social life where interests

are mutually interpenetrating, where problems are solved and conflicts are resolved through well-meaning arguments, negotiations, discussions, persuasions and such other non-violent and peaceful methods, where experiences, sorrows and joys are mutually shared, power and responsibilities are decentralized and shared, where the value of people's participation is of immense and measureless worth, everyone has to be personally responsible for collective actions. Otherwise if only a few are knowledgeable and the rest are dumb and mute witnesses to social actions it will qualify to be a society of slaves. A slave, Plato defined as one, who accepts from another the purposes which control his conduct. A strong and stable India would require a society of free men who are good, knowledgeable and concerned. Such a society will obviously be a literate society.

## 2. Status of Literacy in Karnataka by 2001 A.D

Will Karnataka be a literate society in 2001 A.D? What percentage of the population will be literate? How to quicken and catalyse the growth of literacy in the state? These are the questions which should receive the attention of the Karnataka leaders.

Let us look at the figures of literacy of Karnataka state at four points of time: 1951, 1961, 1971 and 1981. Just after Independence, in 1951, the literacy rate in the state was 19.3 per cent (erstwhile Mysore state). It was slightly higher than the national average of 16.6 per cent. This means, nearly one out of every five persons in the state was literate. It is quite amusing to note that female literacy then was hardly 9.2 per cent. The literacy rate rose up to 25.4 per cent in 1961 to 31.54 per cent in 1971, and further to 38.46 per cent in 1981, the latest census year. In other words from a



position of just around one out of every five the literacy rate in the state moved upto a position of nearly two out of every five persons being literate within a span of 30 years. The state has definitely done well in growth of literacy in terms of proportions. But still the absolute number of illiterates has also gone up over the years.

If we estimate the literacy status of the state by 2001 A.D on a simple arithmetical progression criterion on the basis of past performance, the state will have a literacy rate of 51.24 per cent at the beginning of next century.

Table 1: Literacy in Karnataka

						(Per cent)
Year	All persons	Males	Females	SC	ST	No. of Illiterates
1951	19.30 (16.6)	29.1 (24.9)	9.2 (7.9)	-	-	-
1961	25.4 (24.03)	36.1 (34.5)	14.2 (13.0)	9.06 (10.27)	8.15 (8.54)	-
1971	31.54 (29.34)	41.87 (39.57)	20.76 (18.44)	13.89 (14.67)	14.85 (11.30)	17.6 m
1981	38.46 (36.23)	48.81 (46.89)	27.71 (24.82)	20.60 (21.38)	20.14 (16.35)	22.85 m

Note: Figures in brackets refer to All India literacy levels.

Table 2: Effective Literacy in Karnataka

			(Per cent)
Year	All persons	Male	Female
1961	30.53 (28.79)	43.29 (41.14)	17.12 (15.57)
1971	36.83 (34.45)	48.51 (45.95)	24.55 (21.97)
1981	43.93	55.68	31.68

In the past the state has taken 30 years to improve its literacy position by 19.16 per cent, which means that the arithmetical average literacy rate per year would be 0.639 per cent. Extending the logic, the literacy rate in 2001 would be richer only by 12.78 per cent as compared to that of the position in 1981. In other words, every alternate person would be literate in the state by 2001 A.D. Alternatively, every alternate person will be illiterate. At this snail's pace of literacy growth, Karnataka would be a fully literate state only 2078 A.D. This method of calculation gets complicated if one accounts for female literacy and scheduled caste as well as scheduled tribe literacy rates. Female literacy has gone up from 9.20 per cent in 1951 to 27.71 per cent in 1981, a rise of 18.51 per cent in 30 years, or an average growth of 0.617 per cent. The literacy rate of scheduled caste population has gone up from 9.06 per cent in 1961 to 20.60 per cent in 1981, an increase of 10.54 percent in 20 years, or an average growth of 0.527 per cent. The literacy rate of scheduled tribe population has grown from 8.15 per cent in 1961 to 20.14 per cent in 1981, a rise of 11.99 per cent or an average growth of 0.599 per cent. With such variations, we are left wondering whether even 100 more years will be sufficient for achieving full literacy in the state.

Arithmetical calculation will be fallacious and predictions based on them will not be reliable as there are several new intervention programmes in the state to boost up literacy and a few more, as would be suggested, may be followed. Literacy for all can be achieved through a variety of well-coordinated and integrated programmes. The



programmes that have been in operation in Karnataka state can be thought of under the following headings:

- (i) Formal education of children between the ages 6 to 14,
- (ii) Non-formal education of children not enrolled in formal schools and drop-outs from formal schools in the age-group 9 to 14.
- (iii) Adult Education.

The first two programmes are meant for universalisation of primary education. Let us consider the performance of the state in regard to the programmes of universalisation and adult education before we attempt a meaningful prediction of literacy in the state by 2001 A.D.

## 2.01 Universalisation of Primary Education in Karnataka

The Constitution of India envisaged in 1950 under Article 45 that 'within a period of ten years' all children in the age group 6 to 14 will be provided with a minimum of primary education. In 1956, at the time of reorganization of states in India, the reorganized state of Mysore was formed. There was a review of progress in Universalization of literacy in 1960. The review showed an unsatisfactory progress of Universal Primary Education. Therefore the Compulsory Primary Education Act was passed in the state in 1961. It proposed to make education compulsory at least for the I to IV standards of primary education and children in the age-group 6 to 10 years. The 1971 census showed that the Universal Primary Education had made unimpressive impact on literacy in the state. Enrolment targets had

not been reached. Though the gross enrolment (I to IV standards) was nearly 90 per cent, still the net enrolments were as low as 65 per cent. Non-enrolment of children, late-enrolment, that is, enrolling children at the age of 7, 8 or 9, instead of 6 to the I standard of education, dropping out or children leaving school after they enter the I standard before they complete the IV standard are some of the factors responsible for a low net enrolment ratio. Study after study has shown that school drop-out children are engaged either in paid work or unpaid but valuable work, at home, in the farm or the field, in some household industry, etc. The percentage of children (drop-out) who are engaged in paid work itself (child labour) in rural areas of Karnataka state is over 20 per cent.<sup>1</sup> The percentage of child labour (among drop-outs) in urban areas of Karnataka state is over 25 per cent.<sup>2</sup> These figures exclude those who are engaged in unpaid work. Nearly 94 per cent of non-enrolled and drop-out children do work of value to the home and are not idlers. As such the Government of Karnataka introduced during the Fourth Plan period (1978) a system of non-formal education for non-enrolled and drop-out children in the age-group of 9 to 14 years. It consisted of a part-time education and a continuing education programme of 10 months duration each, wherein literacy and numeracy are the sole objectives of education. Proficiencies which require I to IV standards in formal primary education will be imparted in two years of non-formal education. A

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\*: Gross enrolment = Number of children in standards I to IV divided by number of children in 6 to 10 age-group in the state.

#: Net enrolment = Number of children in 6 to 10 age-group in I to IV standards divided by number of children in 6 - 10 age-group in the state.



student will be eligible thereafter to join the V standard of school education. In addition, the Government of Karnataka under the Janatha rule in 1983 introduced the 'Aksara Sena' or 'literacy on a war footing' Programme. This includes liberal assistance to voluntary agencies for promotion of non-formal education for children (apart from an adult education component). These are instances of intervention programmes in the promotion of 'literacy for all' in the state which need to be considered while making predictions about education in the state by 2001 AD. There are other assumptions in regard to population profile of the state (age-distribution) which will be taken up later. For the moment, let us review the progress of universalization of primary education which will be beneficial for a prognostic perspective.

## 2.02 Performance of Universal Primary Education (UPE) in Karnataka

### Lower Primary Education

The gross enrolment ratio of children in 1956-57, the year of reorganisation of states, at the lower primary stage of education in

Table 3: UPE in Karnataka

	1956-57	1961-62	1962-63	1980-81
LPS	61.1	79.4	91.8	93.6
LPS (I to V)	-	-	-	100.0
Boys	-	-	84.4	84.2
Girls	-	-	-	-
HPS (VI to VIII)	17.9	-	-	39.5
Boys	26.6	-	-	48.3
Girls	8.9	-	-	30.1
SC's (LPS)	-	37.4	-	75.9 (1977-78)
SC's (HPS)	-	30.9	-	51.9 (1977-78)

Karnataka was 61.1 per cent. Out of 2.78 million children in the age-group 6 to 11 years in the state in 1956-57, 1.70 million children were enrolled in the classes between I to V standards. Of them, 1.08 million, (78.4 per cent of total in the category), were boys and 0.62 million, 44.2 per cent of the category were girls. Still, 0.30 million boys and 0.78 million girls had not been enrolled in school.

In 1961-62 also the total enrolment stood at 79.4 per cent. The Compulsory Primary Education Act was passed in 1961 and a vigorous drive for Universal Primary Education was launched. The total enrolment rose to 91.8 per cent in 1962-63 when boys' enrolment was reported as 100.00 per cent. With slight variations the enrolment has stood around 90 per cent. It was 93.6 per cent in 1980-81. The range of variation since 1962-63 has been from 86.0 per cent in 1967-68 to 93.6 per cent in 1980-81, that is, 7.6 per cent. In several years, for instance, in 1966-67, 1972-73, 1978-79, 1979-80, and 1980-81 the boys gross enrolment has been, as reported, well over 100 per cent. The girls' enrolment has always lagged behind. It was 84.4 per cent in 1962-63 and 84.2 per cent in 1980-81. The lowest recorded after CPE Act was 71.0 per cent in 1966-67.

### 2.03 Higher Primary Education in Karnataka

At the time of reorganization of states, hardly 17.9 per cent of children in the age-group 11 to 14 were enrolled in VI to VIII standards of education. Sex-wise, 26.6 per cent of boys and 8.9 per cent of girls were in higher primary stages of education. With considerable variations in the rates of enrolment over the years, the ratio stood at 39.5 per cent in 1980-81. Sex-wise, 48.3% of boys and



30.1 per cent of girls were in higher primary stages of education. The proportion of enrolment has steadily grown over the years though there have been years when enrolment ratios were lower than in 1967-68 than in 1970-71. Thus, after adjusting the figures of enrolment we may find that 3 out of 5 children, every alternate boy and 2 out of 3 girls, in the age-group 11 to 14 are not enrolled in the higher primary stage even in 1980-81.

#### 2.04 Universal Primary Education and the Scheduled Castes

A divergent trend has been observed in regard to the enrolment of Scheduled Caste children at the lower and higher primary stages of education in Karnataka as compared to their performance with that of non-scheduled castes.

As per a time-series analysis of enrolment trends in the state, the enrollment of Scheduled Caste children in I to IV standards in the year 1961-62, was 37.4 per cent. By 1977-78, the enrolment went upto 75.9 per cent respectively. Because of a higher base-year enrolment of non-scheduled caste's perhaps, the differences in proportions of increases in enrolment between 1977-78 and 1961-62 for SC's and non-SC's were higher in favour of SC's. Obviously the annual growth rate in enrolments of SC's has been higher than that of the Non-SC's at the lower primary stage.

In contrast, if 37.8 per cent of non-SC children were in V to VII standards in the state, the enrolment of SC children was 30.9 per cent in 1961-62. The relative enrolments in 1977-78 were 51.9 per cent and 42.0 per cent for non-SC children and SC children

respectively. The difference in the gains in enrolments between the two reference periods for non-SC's and SC's are 14.1 and 11.1 per cent respectively. Obviously, the annual growth rate in enrolment of SC's children has been lower than that of the non-SC children at the higher primary stage.

In brief, performance of SC children in the state as compared to that of the non-SCs is higher at the lower primary stage and lower at the higher primary stage. This is a divergent trend in enrolment.

Even, then it is observed that there is considerable inequality between SC and non-SC's children in favour of the latter in regard to enrolment in primary education. The co-efficient of equality in 1961-62 was 62.5 at the LPS and 50.2 at the HPS. It rose to 81.1 per cent at the LPS by 1977-78 while the index for HPS rose to 63.0 per cent.

#### 2.05 Universal Primary Education: Performance of Districts in Karnataka

There are 20 educational districts in Karnataka state (19 revenue districts; Bangalore District is sub-divided into Bangalore Urban district and Bangalore rural district). The performance of the districts in regard to universal primary education is not uniform in all these districts. It may be noted that the present Karnataka state is a region wherein sub-regions with differing educational history and performance were integrated in 1956. For instance, the enrolment of children in the age-group 6-11 at the lower primary stage in districts belonging to the erstwhile Hyderabad state, known as Hyderabad Karnataka region (Bidar, Raichur and Gulbarga districts) was hardly



27.2 per cent while that of Kodagu was 83.8 per cent, Bombay-Karnat region (Belgaum, Dharwad, Uttar Kannada and Bijapur districts) achieved 79.2 per cent, Madras-Karnataka region (Bellary and Daksh Kannada districts), had achieved 74.8 per cent, and erstwhile Mys districts (Bangalore, Chickmagalur, Chitradurga, Hassan, Ko Mandya, Mysore, Shimoga, Tumkur) had enrolments of 48.9 per cent. position of Madras-Karnataka region was slightly better (30.8 cent) in regard to enrolment in 11 to 14 age group as compared to t of Bombay-Karnataka region (27.8 per cent) and erstwhile Mysore reg (27.0 per cent). Again Kodagu had a high proportion with 54.2 cent and Hyderabad-Karnataka region recorded the lowest figure of 1 per cent. Only one out of 9 girls was going to lower primary sch in Hyderabad-Karnataka region in 1955-56. One out of 34 girls attending the higher primary school.

In a review of enrolment, trends in the state between 1961-62 1977-78 it is observed that seven districts namely Belgaum, Bijap Dharwad, Uttara Kannada, Kodagu, Dakshina Kannada and Bangalore Ur have shown consistently good performance at both lower and high primary stages.

Bidar, Gulbarga, Raichur and Chitradurga districts experien consistently bad performance. Another distressing performance l been noticed from Kolar and Tumkur districts which are hardly 60 from Bangalore City, the state capital. This may be partly explai by the fact that the population of SC's is quite high in Ko district (23.9 per cent) as compared to the State average (13.14 cent), and even Chitradurga district (18.2 per cent).

Hence, future exercises in educational planning, to promote a faster pace of universalisation of primary education and consequently literacy in the state, should pay greater attention and concentrate more intensive efforts to the following six districts: Bidar, Gulbarga, Raichur, Chitradurga, Kolar and Tumkur. Such efforts need to be balanced by continuing efforts to maintain the performance of districts which are already doing well.

## 2.06 UPE and the Incentive Schemes of Karnataka

Karnataka has offered several incentive schemes for catalysing the process of UPE. Some of them are:

1. Attendance Scholarships to Girls
2. Free Supply of Text-Books
3. Mid-day Meals
4. Pre-Metric Scholarship
5. Merit Scholarship
6. Hostel facilities
7. Residential school facilities

Some of these schemes have been initiated as early as 1917. However, systematic, intensive and large-scale efforts in the provision of facilities and incentives began after the CPE Act of 1961.

According to research study, the overall performance of Karnataka state with respect to utilisation of educational facilities and incentives has been moderate. Some districts have been well at the LPS stage, while others have returned better performance at the HPS



stage. Kodagu district in particular and a few other districts such as Bangalore-Urban and Rural, Hassan, Mandya, Dakshina Kannada, Bellary and Uttara Kannada districts have done well in utilisation under the schemes at both the LPS and HPS stages. The other districts need special attention in future efforts. In particular, Bidar, Gulbarga, Bijapur, Dharwad, Chickmagalur, Chitradurga, Kolar and Mysore districts leave much to be desired in their performance in regard to utilization under the schemes both at the LPS and HPS stages.

Performance is wanting in regard to schemes such as 'Free Supply of Text Books', 'Uniforms, Books and Slates', 'Merit scholarships' and 'Hostel Facilities'. Hardly 25 per cent of the total number of children in the state are covered under the 'Mid-Day meals' scheme while in the neighbouring states (Tamilnadu, for example), the noon meal scheme covers 100 per cent of the children.

#### 2.07 Prospects of UPE in Karnataka

With all the efforts for UPE in the state the growth rate in enrolment has not been that adequate as to return 100 per cent enrolment; of course, it has been steady in spite of growth of population. The percentage of enrolment in 1980-81 was 93.6 in total. The percentage is well over 100 for boys and it has stabilized around 84.0 per cent in case of girls. Enrolment has increased from 1.69 million children in 6-11 age group in lower primary schools in 1956-57 to 4.28 million in 1980-81. The growth rate computed on the basis of linear trends is around 1.1 per cent. A higher growth has been recorded after 1978 and by 1985-86 it is presumed that a maximum



of 1.5 per cent growth rate might have been achieved. 1.07 million boys and 0.62 million girls were in schools (I to V stages), in 1956-57 while the figures in 1980-81 were 2.42 million and 1.86 million respectively.

So far the analysis is based on enrolments in 6-11 age-group and I to V standards from data based on educational statistics across the states published by the Government of India<sup>4</sup>. This has been used to understand the trends in enrolment in the State. But to make predictions, actual enrolments in I to IV standards which is the pattern of lower primary schooling in the state will be considered from among population in 6 to 10 age group. The enrolment in I to IV standards in 1986<sup>5</sup> is of the order of 4.15 million children. This is out of an estimated population of 4.93 million in 6 to 10 age group in 1986<sup>6</sup>. The percentage of enrolment is of the order of 88.0. Taking increases in enrolment on the basis of past trends and taking a high side at a rate of 1.5 per cent the total number of children in I to IV standards in the state by 2001 will be another 24 per cent of the enrolment in 1986. The figure would be 5.15 million children in 2001 A.D. in I to IV standards. The estimated population of the state by 2001 A.D. in 6 to 10 age group would be 5.44 million in the state. By inference the enrollment of children even in 2001 A.D. in I to IV standards and in the age group 6 to 10 would be 94.7 per cent. It will not be 100 per cent overall. This estimate would become true if additional efforts are made in regard to enrolment of girls. As of now, there is 100 per cent gross enrolment in case of boys whereas the gross enrollment of girls is around 85 per cent. Again there is disparity between enrollment levels of non-scheduled caste and



scheduled castes. A differential speed in enrolment has to be maintained in favour of girls, scheduled castes, backward castes and minorities. Assuming that efforts will take into consideration these aspects it is observed that 5.15 million children will be enrolled in lower primary schools by 2001 A.D.

Likewise the enrolments in V to VII standards in the state in 1985-86 is of the order of 1.55 million. This is out of an estimated population of 2.90 million in the age-group 11 to 13 in the state in 1986. The percentage of enrolment is of the order of 53.0. Taking increases in enrolment on the basis of past trends and again taking the high side at the rate of 1.0 per cent the total number of children in V to VII standards in the state by 2001 A.D. will be another 15.0 per cent of the school going population in 1986. The figure would be 1.7 million children by 2001 A.D. in V to VII standards (Estimate No.1). There will be an increasing demand for higher primary education in the following years. Hence the enrolments will be well over 1.85 million children considering an annual average growth rate of 1.25 per cent (Estimate No.2). The estimated population of the state in 2001 AD in the age-group 11 to 13 would be 3.25 million. By inference, the proportion of total population in 11 to 13 age group who will be in higher primary schools by 2001 A.D would be around 57 per cent. The assumptions which are considered for reaching 94.7 per cent enrolment at the lower primary stage hold good for reaching 57 per cent enrolment at the higher primary stage.

## 2.08 Children in School by 2001 A.D.

In brief, there will be 7 million children in primary schools in Karnataka State by 2001 A.D. 5.15 million would be at the lower primary stage and 1.85 million would be at the higher primary stage.

For estimating literacy in the state by 2001 A.D. on the basis of these figures, it is essential to consider the population who complete IV standard by 2001 A.D. and not just enrolments by 2001 A.D in I to IV standards. For this, drop-out trends have to be considered for making adjustments. These will be taken up later. For the moment, estimation of educational requirements or needs for 2001 A.D. to reach 7 million enrolment will be made.

## 2.09 Educational Needs of Karnataka at the School Level by 2001 A.D

Karnataka has been passing through the same stages of educational development as many other countries of the developing world have experienced. There are three phases in the educational growth of a developing country/state. They are: the phase of quantitative expansion of education, the phase of consolidation of the gains of educational growth and finally the phase of qualitative improvement. Karnataka has passed through the first stage and is in the process of completing the second phase and ready to enter the third phase.

There were 12553 primary schools in Karnataka state at the time of integration in 1956-57. 11763 of them were lower primary schools. There were hardly 790 higher primary schools. The state experienced enormous growth and expansion of schools in the following five years.



Table 4 : Growth of Primary Schools in Karnataka

	Total Primary Schools	LPS	HPS
1956-57	12553	11763	790
1961-62	28924	21976	6948
1974-75	33105	21812	11293
1979-80	34706	22532	12174
1980-81	35143	22800	12343
1984-85	37776		

Within one year the number rose to 22080, an increase of 10317 schools, nearly 90 per cent increase. The number of HPS grew from 790 to 1934, an increase of nearly 145 per cent. By the time, the Compulsory Primary Education Act was passed in 1961-62, there were 28924 primary schools, of which 21976 were lower primary schools, and 6948 were higher primary schools. The average annual growth rate in general has been 26 per cent. The rate of annual growth has been 17.4 per cent at the lower primary stage and as high as 156 per cent at the

Table 5: Period-wise Growth of Primary Schools in Karnataka

	5 years	13 years	5 years	1 year	4 years
Total	16371	4181	1601	437	2633
	26% rate	1.1% rate	0.96% rate	1.25	1.85
LPS	10213 17.4% rate	-0.06% rate	0.66%	1.20	-
HPS	6158	4345	881	169	-
	156% rate	4.8% rate	1.58%	1.40	

higher primary stage. It may be noted that a very great part of this growth took place in 1 year (1956-57 to 1957-58). The number of lower primary schools rose from 11763 in 1956-57 to 22080 lower primary schools in 1957-58. Figure of LPS for 1961-62 is lower than that of 1957-58 as quite a number of lower primary schools (including the difference) were expanded and converted into higher primary schools. The rate of growth has been steady of course after 1957-58. However, the number of schools rose to 33105 by 1974-75, the first year of the Fifth-Five Year Plan. 21212 were LPS and 11293 were HPS. Because of conversion of lower into higher primary schools the number of LPS over the years came down apparently recording a negative growth rate of 0.06 per cent. The growth rate of HPS from 1961-62 to 1974-75 was 4.8 per cent. By 1979-80 even the growth of HPS stabilized and the figure stood as 12174. By 1984-85 there were 37776 primary schools in the state including both LPS and HPS. Since 1965-66 and upto 1985-86 the ratio of LPS to HPS is around 2:1. (The number of HPS is slightly higher of course than just 2:1).

It is observed that in 1985-86 25000 LPS and 13000 HPS are serving 4.15 million LPS children and 1.55 million HPS children. The school-pupil ratio (which will be a mechanical calculation, as there will be in reality a number of heavy enrolment as well as small enrolment, almost unviable, LPS) at the moment works out to be 1:166 in the I to IV standards of LPS or 1:41 per standard. The ratio works out to be 1:120 at the higher primary schools which have 1 to 7 standards. The strength will be higher in I to IV standards and lower in V to VII standards of HPS. (The ratios here are not teacher-pupil but school-pupil ratios).



As per the Fourth All India Educational Survey, <sup>7</sup> the number single-teacher schools in Karnataka state (1978-79) was 16341 out a total of 22528 lower primary schools, constituting 72 per cent

Table 6 : All Primary Schools with number of Teachers in position

Zero	1	2	3	4	5	75	Total
381	16341	3627	788	509	254	628	22528

such schools. According to another estimate, the proportion single- teacher schools in the state in 1986 was around 55 per cent. The National Policy on Education 1986, envisages under the 'Operational Blackboard' programme, a phased conversion of all single-teacher schools into at least 2 teacher schools <sup>8</sup>. This is a commendable proposal from the view point of qualitative improvement of primary education. Karnataka should realise this dream by 2001 A.D. It would be desirable to appoint at least one lady teacher in every primary school to promote enrolment of girls. This would mean that along with a regular in-take of teachers for increasing enrolments every year there is a need to recruit an additional 15000 teachers in the next 10 years. The assumption is that the government will not start any more single-teacher schools in future. If there is a need to start a school in an area where there is demand, then it will be a minimum two-teacher school. According to an ISEC study which compared high drop-out regions with low drop-out regions in the state it is clear that the presence of an additional teacher/teachers (not single teacher schools) makes a significant contribution in arresting the

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drop-out phenomena in lower primary schools, 1000 teachers per year in addition to regular supply should be a good proposition.

## 2.10 Norms for a School

There is a need to develop a norm for opening and maintaining primary schools. This norm should reflect the objectives of school education like total or integrated personality development, effective and enlightened citizenship, environmental awareness, skills in reading, writing and arithmetic, rational, secular and modernized outlook commensurate with the vision of the new society that we are trying to herald (democratic socialism) etc. The minimum school facilities required to promote and realise these objectives should be identified in terms of physical and human resources. The curriculum, syllabus and text books ought to reflect these objectives and also be taken as the basis for arriving at the proposed norm. (Recognition of schools should be based upon this norm at a later date). Unless there is qualitative improvement of primary education, there is no hope of universalisation or full literacy even after one more century; the same facilities can be thrown open to non-formal education and adult education. This should be possible through institutional planning. School should be done in every block and a Resource Atlas has to be developed.

It is outside the scope of this study to suggest the exact number of schools, buildings, additional rooms, playgrounds, charts, maps, equipment, etc. Task forces can be set up for the purpose. It may

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\* : "Education in Rural Areas : Constraints and Prospects" by A.S. Seetharamu and M.D. Ushadevi, Ashish, New Delhi, 1985 (Study in Karnataka State).



only be observed that the future policy should be one of consolidation at the lower primary level and expansion at the higher primary level in regard to universalization of primary education. A prospect may be visualized wherein through proper and phased strategies the ratio of LPS:HPS can be changed from the present position of 2:1 into 4:3. The financial implication of the proposal as well as that of identifying and honouring a 'norm' for opening and maintaining primary schools will have to be worked out.

## 2.11 UPE and Drop-out Phenomenon in Karnataka

A discussion of UPE will be incomplete without a serious consideration of drop-out phenomenon. A drop-out is considered as such for not completing a full term of a course which qualifies or certifies him for a particular level of attainment. A child admitted to the I standard of a lower primary school but will not complete the IV standard will be a drop-out from the lower primary stage. He may leave school just after one day, before or after completing the standard, II standard or III standard, before completing IV standard education. A similar definition holds good for higher primary stage also. Even a long absentee in a year who will not join again is a drop-out even though his name may be retained in the attendance register for 4 or 7 years as is the case in Karnataka state. This conception of a drop-out has significant implication for the planning and organization of non-formal education for non-enrolled and drop-out children in the age-group 9 to 14 in the state and consequently for effective and meaningful universalization of primary education.



It is estimated that out of every 100 children who enter the lower primary school only 42 complete the term (1981 data) and 28 complete the higher primary level. In other words, the percentage of children who drop-out from LPS constitute 58 per cent. By 1986, this figure may be around 55 per cent. It will be impossible to totally eliminate the drop-out phenomena by 2001 A.D. School participation and, conversely drop-out phenomenon have a bearing on the level of economic, social and political development of a society. Apart from the quality of education provided and its accessibility, ownership of means of production, availability of employment, distribution of income, levels of living and levels of welfare, child labour, infant mortality, class consciousness and political mobilization, concern for the poor and lowly, organizational structure and institutional efforts and a variety of such factors operate severally and jointly in the dynamics of school participation and educational development of society. It would be unwise to predict and plan educational growth in isolation from these factors. However, it is assumed, considering several of these factors that the drop-out rate would not be less than 40 per cent at the LPS by 2001 A.D. Highest drop-out rates among the drop-outs are at the first standard itself. Therefore, more attention should be paid to reduce drop-outs at that level. Then only this target can be reached. In other words, out of 5.15 million children who will be in school by 2001 A.D., around 2.0 million will be drop-outs. Non-formal education programmes should take into account these 2.0 million drop-outs as well as the non-enrolled children who are estimated to be around 1.34 million by 2001 A.D.



## 2.12 Non-formal Education (NFE) in Karnataka

Karnataka has to provide non-formal education to 3.34 million children by 2001 A.D. if it has to universalize primary education. Can Karnataka achieve this feat? What is the past performance and the present trend? The answers to these questions may provide some clue to the future trends.

Following the objectives of the Fifth Five Year Plan the state government launched two programmes of non-formal education in 1977 for children in 9 to 14 years age-group, viz., part-time education and continuing education. Non-enrolled children and drop-outs from I and II standards formed the target of part-time courses. Children who have completed the initial stage of schooling but dropped out later at the III or IV standards were the targets of continuing education courses. Both the courses have been of 10 months duration. Minimum competencies which are normally acquired in I to IV standards are developed in these two courses taken together. The graduate of non-formal education courses will be eligible for entry into the standard. This is called as the second opportunity or multiple point entry provision.

The Fifth Plan paid a lip-service to NFE. A real boost was given to this programme in the Sixth Five-Year plan of the State. Targets for two years of the Fifth plan were: 10770 centres (1976 to 1979, 3-year period, plan approved in 1976 and implemented in 1977 only), 0.268 million children; allocation of Rs.18.935 million. Coverage during the Fifth-plan period: 1000 centres; 22354 children; Rs.0.676 million, hence, it is observed that the achievement fell far below the targets.

Targets during the Sixth plan (revised 1980-85): allocation of Rs.1 million with a break-up of Rs.0.2 million per year. Coverage 9260 centres opened and 0.27 million children covered with an expenditure of Rs.6.944 million.

The planning of NFE has been arbitrary and inconsistent even though favourable at times to N.F.E. NFE was started initially in 4 districts of the state and was being run in 8 districts in 1984-85.

It is expected that NFE will be spread all over the state by 2001 A.D. As of now, the location of centres is not scientifically done. Scientific basis can be provided to the programme if the distribution and location of centres in the blocks and the districts is based on their ranking on the basis of non-enrolment and drop-out phenomenon.



with a special reference to that of girls, SC's and ST's. Even enrolment in N.F.E. should be highly skewed in favour of girls, SC's and ST's. In the following years, 10000 NFE centres should be started every year in the state under the regular as well as Aksara Sena Projects (1984-85 figures: 4620 centres and 0.095 million children) with an enrolment of 0.30 million children. The grassroot level local government institutions should be used for the purpose. In fact, it is better if responsibility is pinned down, accountability is ensured and performance of these institutions measures in terms of target-coverage in non-formal education - adult education and formal primary education; leadership can come from the DIET's (NEP plan). This is a minimum target and can be expanded progressively over the years to reach a figure of 0.45 million children and 15000 centres by the year 2001 A.D. This will work out on an average to 50 centres per block (revenue block) initially and 75 centres by the year 2001 A.D. The computed per pupil cost of N.F.E. as per one of our research studies<sup>9</sup> is Rs.33 (computed on the basis of enrolments and costs, 1981-82). The cost per pupil in formal education during the year 1981-82 in Karnataka was Rs.134/-. The total cost of the NFE programme for the various years and the annual costs by 2001 A.D. can be worked out keeping in view the inflationary trend.

### 2.13 Total Number of Out-of-School Children by 2001 A.D.:

There will be 5.44 million children in the age-group 6 to 10 and 2.90 million children in the age-group 11 to 13 by 2001 A.D. The total number of children in 6 to 13 age-group thus will be 8.34 million. 5.15 million children in the age group 11 to 13 will be in LPS and HH respectively totalling 7.00 million children. There will be 2.0

million (out of these 7.00 million) drop-outs from LPS and 1.34 million non-enrolled children. Out of these 3.34 million children the NFE would be catering to, as estimated and if everything runs as expected, 0.45 million children in the age-group 9 to 14. Hence, it is observed that still 2.89 million children will be out-of-school even in 2001 A.D. In brief, the proportion of out-of-school children will be 35.0 percent. Still, this should be taken as a commendable achievement in comparison to an estimate of 53.0 percent out-of-school children in 1981-82. These 2.89 million children will be the potential adult illiterates. They have to be reckoned in a programme of adult education for the 15 to 35 age-group.

#### 2.14 Adult Education in Karnataka

It will be shocking to know that, as per an estimate, there will be 954 million illiterates in the world by 2000 A.D. and 500 million out of them will be in India alone. Of the total illiterates in 15-19 age group by 2000 A.D. (World Bank Projection), 54.3 percent will be in India. To what extent can Karnataka absorb its proportion of this shock.

The population of Karnataka is 37.0 million (1981 census). Literacy in the state is 38.41 percent of this population. The population in the age group 15 and above is 22.43 million. Of them 55.72 percent or 12.5 millions are illiterates. In particular 7.7 out of this 12.5 million illiterates are females (61.60 percent). Again 6.0 million persons in the age-group 15-35 are illiterate and 3.8 out of these 6.0 million are females. This is the prevailing picture of literacy in the state inspite of a long and glorious record of adult



education. A programme of adult education under the NAEP has been in operation which mainly comprises of Adult Literacy Programme (State sector) and Rural Functional Literacy programme (Central sector). Though Literacy went up from 25.4 percent in 1971 to 38.4 percent in 1981.

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\*Challenge of Education, 1986.

In 1981, illiteracy went up in terms of absolute figures from 170 millions in 1971 to 22.85 millions in 1981.

In this context, the Janata Government in Karnataka launched Aksara Sena programme. Adult education is one of the main components of this programme. Unlike the NAEP programme which has a more comprehensive, three dimensional and ideal objectives of promoting literacy in general, environmental and citizenship awareness and promotion of functional developmental awareness and skills, the Aksara Sena programme has a limited and practical objective of just promoting 'literacy' in the state. Literacy is defined in terms of reading and writing and solving simple arithmetical problems. The course will be of limited duration. With a minimum enrolment of 30 persons there will be three courses in a year at a centre. The non-recurring cost per centre (1983-84) per year is Rs.318/- and recurring cost Rs.39/- per person. With three courses per year the total cost would be Rs.1191/-.

The focus of adult education under Aksara Sena is on adults in the age-group 15 to 35 years. The universities of the state, the Nehru Yuvak Kendras (Youth organisation), the ICDS projects, the State Adult Education Council and several other voluntary organisations assist the state in the programme.

Predictions based on trends in opening of adult education centres every year and enrolments therein would be misleading as the trend is quite inconsistent. For instance, in 1980-81 and 1981-82 the number of centres were 7116 and 7219 respectively while enrolments were 2.13 lakhs and 2.12 lakhs. But in 1984-85 there were 16742 centres and 5.04 lakh coverage. It is proposed to cover 9.96 lakh adults during 1987-88.

Table 7: Adult Education in Karnataka

Year	No. of Centres	Enrolment
1980-81	7116	213518
1981-82	7394 (New)	218121
1982-83	8748 (Regular)	140179
1984-85	16742	504360

A generous estimate of number of illiterates in 1984-85 would be 150 lakhs out of a total of 260 lakh adults (above 15 years of age). Only 5.04 lakh adults are covered in 1984-85 out of these 150 lakhs. Let us say that 9.96 lakhs are covered as proposed in 1987-88. This will be out of about 170 lakh illiterates out of a total adult population of 290 lakhs. In other words, hardly 6, 7, 8 or maximum 10 percent of adult illiterate population is being covered in the state.

The population of the state by 2001 A.D. would be 555 lakhs (55.5 million, 5.55 crores). Out of this, the total number of adults will be



(above 15 years of age) around 390 lakhs. With the best of efforts in UPE and NFE in the coming years as well as the efforts in adult education also, there will be bound to be 130 lakh illiterates in the state. This will be true assuming that the UPE enrolment will be maintained at a high level through several measures at 94.0 percent by 2001 A.D. even for girls and SC & ST; the out of school children will go down from 35 percent to 22 percent and enrolments as well as successful completion in adult education will be maintained at 10 percent of illiterates every year for the next fifteen years.

#### 2.15 Literacy in Karnataka - 2001 A.D.

There will be 13 million illiterate adults in 2001 A.D. out of total 39 million adults (who will be above 15 years of age). Add this 2.89 million out of school population who escape the UPE and NFE network. Totally, 15.89 out of 48.90 million population in the age group above 5 years will be illiterate by 2001 A.D. In other words there will be 23.10 million adult literates who constitute 62 percent of their total in the 15+ age group. Again there will be 5.85 million who become literates in the 6 year and above, age group would be 28 million. This is out of 47.43 million persons. Thus, the effective literacy would be, (6 and above age group), around 61.0 percent. The general total literacy in the state by 2001 A.D. would be around 55 percent. If the figures are smoothened then the literacy may be expected to be 55 percent of the total population in the state.

Table 8: Percentage of Literacy in Karnataka

	1951	1961	1971	1981	1991	2001

General rates	19.30	25.40	31.54	38.46	-	55.00
Effective						
Literacy rates	-	30.53	36.83	43.93	-	61.00

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## 2.16 Programme of Action:

Several on-going programmes of UPE, NFE (9 to 14) and adult education need to be strengthened as well as new programmes initiated to reach 55 percent literacy in the state. It is quite possible that with imaginative programmes and their committed implementation, general literacy may boost up to 60 percent also but never beyond that. 100 percent literacy would still be a dream. The programmes of action need to be discussed and chalked out by a high-power committee with assistance from task groups. It is believed that the state government will definitely think along these lines.

## 3.01 Levels of Progress: Secondary, Higher Secondary and Vocational Education

Karnataka as an integral part of the Indian polity has experienced the process of modernisation wherein scientific and technological development has been a key instrument. It has contributed to the stock of manpower required in this regard. India today is the third ranking country in the world in terms of the strength of such manpower. One of the unwelcome side-effects of this process has been an utter disregard for the adequate production of middle-state disparities. This can be done through a vigorous and sustained expansion of secondary and higher secondary as well as vocational education, with special attention to expansion of schools in rural areas.



### 3.02 Growth of Secondary Schooling in Karnataka:

At the time of reorganisation of states there were 266 high and higher secondary schools in the integrated state. They increased to 778 schools by 1960-61 with an age-group enrolment of 11.1 percent. The enrolment in 1970-71 was 5.31 lakhs in 2002 high schools only, which was 16.4 percent of the relevant age-group population (14 to 17). It slowly and steadily increased to 2370 high schools in 1981-82 with an enrolment of 6.77 lakhs. However, the demand for secondary education increased quite a bit thereafter and the enrolment went upto 7.90 lakhs (22.0 percent of 14 to 17 age-group population) in 3513 schools in just 3 years, that is by 1984-85 (see table 6). This would be the type of demand that would follow in the years ahead. As enrolments and successful completion rate increase in LPS and HPS stages, as overall development efforts get more and more decentralised the demand for secondary education also increases. On the basis of trends it is estimated that by 2001 A.D. around 30 percent of the population in the age-group 14 to 17 will be in secondary schools totalling an enrolment of 13.82 lakhs. It will be nearly 75 percent more of the present level of enrolment. It will be grossly incorrect to suggest that the schools and teachers (1984-85, 28701 high school teachers) should also be increased by 75 percent. Economy of scale would suggest that by having additional sections in existing high schools, upgrading higher primary schools etc.; the number of new high schools to be started will be greatly reduced. 'School Atlas for every area, therein identifying feeder schools and student-flow should have to be prepared.

Table 9: Growth of Secondary Education in Karnataka

Year	Number of Institutions	Enrolment
1956-57	266 H/HS	516506
1957-58	556 "	-
1958-59	617 "	141458
1959-60	664 "	-
1960-61	778 "	11.1%
1961-62	875 "	13.2%
1962-63	1025 "	14.5%
1964-65	1337 "	414367
1965-66	1491 "	449498
1966-67	-	23.1
1967-68	-	507974
1968-69	-	530864
1969-70	1915 "	-
1970-71	2002 "	531823 (16.4%)
1974-75	-	545956 (15.5%)
1975-76	HS	336892 (15.5%)
1976-77	HS 2090 + JC 316	15.5%
1977-78	HS 2110 + HSS 254 + JC 60	17.2%
1978-79	HS 2184 + HSS 317 + JC 60	21.1%
1979-80	HS 2228 + HSS 269 + JC 64	-
1980-81	HS 2344 + HSS 276 + JC 64	6.77 Lakhs
1984-85	HS 3513 + HSS 737 + JC + 2 Dgr. 126 + 195.	7.90 Lakhs

Notes: HS : High School

HSS : Higher Secondary School

JC : Junior College.



1978-79	HS 2184 + HSS 317 + JC 60	21.18
1979-80	HS 2228 + HSS 269 + JC 64	-
1980-81	HS 2344 + HSS 276 + JC 64	6.77 Lakhs
1984-85	HS 3513 + HSS 737 + JC + 2 Dgr. 126 + 195.	7.90 Lakhs

Notes: HS : High School  
HSS : Higher Secondary School  
JC : Junior College.

Table 10: Growth of Secondary Schools in Karnataka

Year	No. of institutions	Enrolment (lakhs)	% age of 14-17 age group
1960-61	778	7	11.1
1970-71	2002	5.31	16.4
1981-82	2370	6.77	-
1984-85	3513	7.90	22.0

### 3.03 Qualitative Improvements:

A number of qualitative improvements are required in secondary education. There are a number of schools which record zero percent result at the school final (SSLC) examination.

Table 11: 1981 SSLC Examination Results in Karnataka:

	Zero %	Less than 10%	0-10%
Rural	53	202	255
Urban	27	140	167
Total	80	342	422
Rural	66.25%	59.05%	62.65%

There were 80 such schools in 1981 SSLC examination, 53 from rural areas (66.25%) and 27 from urban areas (33.75 percent) (Table 11). Along with this there are schools which secure less than 10 percent result. The total number of schools which secure such low results, may be called the chronically sick schools; they were 422 in 1981. 255 were from rural areas only. 83.76 percent or 355 out of these 422 schools were from the 10 educational districts of old Mysore area. They are Bangalore City District (54), Bangalore Rural District (32), Kolar (35), Tumkur (48), Mysore (50), Mandya (21), Chitradurga (30), Chickmagalur (15), Shimoga (27) and Hassan (43). 20 were Bellary district and rest of the 47 schools were from the other 9 districts of the state. There is a need to step up the efficiency of chronically sick schools. The general performance of erstwhile Mysore districts has also been consistently bad and below state average as one of our on-going studies has shown. <sup>10</sup> This is true of Bellary district also. In future, quality imposition, regulation and control should be concentrated on these districts.

Glaring disparities are observed between the performance of rural and urban areas on the one hand at the SSLC examination. Similar disparities are observed between the performance of SC's ST's and others. These imbalance have to be offset in the following years. Again it is a 'norm' for a secondary school that should be set, defined and followed. This can be done through administrators as well as subject-teacher workshops and consolidation of their recommendations.



There is a stream of secondary schools which are called as junior technical schools. Their number has hardly gone up from 3 in 1961 to 12 in 1985. All along they have been under the Department of Technical Education. They should be delinked from that Department and attached to the Department of Public Instruction. More number of such schools

Table 12: District-wise Distribution Chronically Sick Schools in 1981 in Karnataka

Total	422	
<u>Old Mysore</u>	355	83.76
Bangalore City	54	12.70
Bangalore Rural	32	7.52
Kolar	35	8.23
Tumkur	48	11.29
Mysore	50	11.76
Chitradurga	30	7.05
Mandya	21	4.94
Chickmagalur	15	3.52
Shimoga	27	6.35
Hassan	43	10.11
<u>Coorg</u>	11	2.58
<u>Bombay Karnataka</u>	10	2.33
Dharwar	03	0.70
Belgaum	03	0.70
Bijapur	01	0.23
U.K.	03	0.70
<u>Hyderabad Karnataka</u>	18	4.22

Gulbarga	10	2.35
Raichur	07	1.64
Bidar	01	0.23
<u>Madras Karnataka</u>	28	6.58
Dakshina Kannada	02	0.47
Bellary	20	6.11

Table 13: Districts with less than Average Results:

	1978	1979	1980	1981	1982
Old Mysore	39.10	37.65	41.43	22.53	35.91
Bombay Karnataka	70.80	70.90	75.67	57.00	69.10
Hyderabad Karnataka	62.96	67.88	93.86	48.26	62.70
Madras Karnataka (mostly because of Bellary)	53.75	50.75	52.15	31.00	45.95
State average	60.10	60.40	61.70	38.20	48.70

Table 14: SSLC Performance in Karnataka State

Year	Appeared	Passed	Percentage
1971	122614	47638	38.8
1972	126420	52331	41.4
1973	122110	51249	41.9
1974	125843	62754	49.9
1975	134573	73769	54.9
1976	136898	70754	51.7
1977	140275	78164	55.7



1978	151578	91033	60.1
1979	159683	96498	60.1
1980	177662	109644	61.7
1981	177778	67927	38.2
1982	256594	124952	48.7

Table 15: SC and ST Status: SSLC Performance:

	1978	1979	1980	1981	1982
SC & ST appeared	11.94	11.72	12.46	10.74	11.80
Status	88.05	88.27	87.53	89.25	88.19
Passed SC & ST	36.64	35.54	40.77	23.89	35.22
Status	52.43	51.01	55.12	38.15	50.44

(1980-81 New Syllabus was introduced)

should be started over the years independently or better by attaching them to the higher secondary schools who offer vocationalisation at the +2 stage.

### 3.04 Higher Secondary Education:

Higher secondary education is organised in a haphazard +2 stage of education is offered by institutions called as independent junior colleges which do not have either a high school section or a college attached to them. They are also offered by higher secondary schools which are extensions of high schools. They are again tailpieces of degree colleges wherein they serve as feeder institutions. Junior

colleges are administered by the Pre-university Board, higher secondary schools are administered by the Department of Public Instruction and +2 stage of a degree college is administered by the Department of Collegiate education. They have a common examination administered by the Pre-university Board. There were 737 higher secondary schools, 126 junior colleges and 195 (pre-university) degree colleges in 1984-85, totalling 1058 institutions (850 in 1983-84). The total enrolment in 1984-85 was 325000. The first reform required is to bring the whole of higher secondary education under a single Directorate. Higher Secondary level of education should be made compulsory for primary school teachers along with teacher training certificates. (Now SSLC is enough).

### 3.05 Vocationalisation in Karnataka:

The National Education Commission of 1966 recommended as far back as 1966, a policy of progressive vocationalisation of education in India. In particular the Commission recommended the vocationalisation of higher secondary education. This recommendation was accepted and following a national policy, the Government of Karnataka implemented the vocationalisation of the +2 stage in 1977. One of the several avowed objectives of vocationalisation was to wean away students from general education courses and make them directly fit for the world of employment. In 1977, Karnataka started this experiment in 13 colleges of 3 districts (Bangalore, South Kanara and Dharwar) with 916 boys and 113 girls (total 1029 students). It spread to 45 colleges in 1978-79. Initially 52 vocational subjects had been offered. By 1984-85 there were 132 colleges and 212 courses across all the districts of the state. Enrolments increased from 2898 to 2951, 3608, 4450 and 5428 in



the years from 1980-81 to 81-82, 82-83, 83-84 and 84-85 respectively. Still the total enrolments in +2 vocational courses has been around 3.5 percent of the total +2 enrolment in the state. Karnataka has been one of the better performing states in the country in regard to vocationalisation. By 2001 A.D. the percentage of enrolment in vocational courses should be at least 15 percent of the total enrolment. This itself will be a big achievement keeping in view several practical problems that are affecting vocationalisation.

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ISEC conducted a study on vocationalisation in 1980 and followed it up with a workshop also so as to diagnose the problems in the field and find ways and means of ensuring better prospects for vocationalisation. Institutional planning, Resource mapping, two-way dialogue between industry (not necessarily manufacturing industry) and education for designing courses, pooling human and physical resources, laboratory techniques of education in favour of theoretical courses, provision of employment opportunities, assistance for self-employment, mobile maintenance-of-equipment unit, transitional opportunities for graduate and technical education etc., are some illustrative measures that need to be initiated or strengthened.

One of our studies has shown that vocational education provides the highest life-time returns of income.<sup>12</sup> Incentives should be given for economically weaker sections and SC's and ST's to profit from this. This would eventually reduce class imbalance.

#### 4.01 Higher Education in Karnataka: Relevance?

To what extent the growth of higher education in the state has

been relevant to the needs of the state? How to examine the quality of higher education in the state and improve it in desired directions? Whether the investments made so far are matched to the social returns on the one hand and commensurate with the objectives of equity and social justice? Has it produced enlightened leadership for the state in various spheres of life? Who benefits from the present situation in higher education? In the light of answers to these questions, how to provide future directions and regulate higher education in the state? Specifically what ought to be the status of higher education in the state by 2001 A.D. and how to shape it? These and similar questions should form the focus of a prognostic study.

#### 4.02 Growth of (General) Higher Education in Karnataka:

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Karnataka began with 12 colleges in the state in 1956-57, raising to 51 in 1957-58 which remained constant upto 1962-63. Their number increased to 71 by 1964-65 to 151 by 1969-70, to 237 by 1976-77 and to 253 (colleges for general education at degree level) by 1984-85. They are now spread over 5 universities of the state. There are also two Agricultural Universities at the moment. There are three institutions of higher learning which have a deemed university status. The Indian Institute of Science, Bangalore and the CFTRI offer graduate, post-graduate and doctoral programmes. A separate university has been established at Shimoga and there is a proposal to establish a Kannada University at Hampi.

Enrolments in general education (BA, B.Sc. B.Com.) have gone up from 29493 in 1956-57 to 85506 in 1967-68, 124100 in 1968-69, 249775 in 1983-84 and 262284 in 1984-85. The proportion of enrolment has been



ranging from 6.0 percent in 1977-78 to 10 percent in 1984-85 of the age-group population. \* If a redirection to higher education is not given in the state, then there will be nearly 4.5 lakh children in the

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\* : "Education in the States", Annual reports published by the Ministry of Education, Government of India, 1956-57 to 1980-81.

state demanding general graduate education. There will have to be another 200 degree colleges to satisfy this demand. Is it worthy to reach this position?

#### 4.03 Relevance:

Relation of higher education to the man-power needs of the state is one of the important indicators of relevance of higher education. From this point of view it is observed that graduate unemployment has gone up from 11.07 percent in 1957 to nearly 21 percent in 1985. <sup>13</sup> It has almost doubled during the reference period. If the situation persists then there is every chance that one out of every four graduates will be unemployed at any point of time in the state.

Discussing about supply of leadership it is observed with reference to bureaucracy and supply of senior civil servants (Indian Administrative and Allied Service Examination) that hardly do the Universities in the state produce persons who either are interested in the senior civil services or qualify for it. There was not a single person who (appeared or) qualified in the IAS examination in 1981 from the universities of Karnataka. Out of 5920 who appeared, 646 qualified. 36.2 percent of them came from Delhi University and the JNU. 58.2 percent including these two universities came from universities, the other three being Rajasthan University, Jaipur

Punjab University, Chandigarh, and Allahabad University, UP  
Incidentally it is observed (though it is not with reference to higher education) that in National Talent Search Examination of 1983, 74083 students appeared in the country out of whom 750 were selected. Karnataka's record was, 2968 appeared (4 percent of total) and hardly 17 (2.3 percent) were selected.

Higher education is also irrelevant to the needs of the students also. In a study made at ISEC on rural immigrants in higher education (a case study of post-graduate admissions in Bangalore University, 1980)<sup>15</sup> it was observed that nearly one out of every three students who came for higher education did not have any plans for employment in the organised sector. They wanted to go back to agriculture which is their family occupation. Being young in the family, (and as there were elders to look after the farms), they came to pursue higher education to increase their general knowledge. But they also had to pass through the same uniform structure and courses like other students who had different plans in life. Another finding was that many of the poor but merited rural students did not enroll in PG courses after getting admission as they did not have facilities to stay in Bangalore City (being first generation migrants); proper counseling also was not available to them about the limited available facilities.

#### 4.04 Medical, Engineering Education and other Professional Education:

Medical and Engineering education has experienced an erratic development in the last decade. This is commonly called as the commercialisation of professional education. Commercialisation has



been taking place not only in engineering and medical education but also in some of the other courses, and in varying degrees, such as pharmacy, veterinary science, teacher education, polytechnic education, law, etc. There were only 5 government and 11 aided engineering colleges in the state in 1985-86 while 34 were unaided colleges which were run on capitation fees. Likewise there were only 4 government medical colleges and 12 private, all unaided medical colleges. 54 per cent of admissions in 1984-85 and 55 per cent in 1985-86 for engineering courses in the state were based on capitation fee. Again 52 per cent of admission in 1985-86 and 53 per cent admission in 1986-87 for Medicine was based on capitation fee. A norms have been flouted in regard to the provision of equipment facilities (laboratories, workshops, hospitals, etc.), quality teaching staff, etc. They cater to people from outside the state in a larger proportion than for those from within the state. A convergence of communal, political and economic considerations are seen to operate in the dynamics of professional education in the state.

Even in regard to secondary teacher education in the state (B.Ed. degree) it is observed that from 19 colleges in 1965, the number grew to 45 in 1980-81. 10 colleges were started in 1972 and 11 more in 1980-81. This is again an erratic development. There are 12 colleges of primary teacher education (TCH) and another 126 junior colleges offering 'Education' as a vocational course at the +2 stage.

Directions of development have been mostly unplanned, erratic, arbitrary, inconsistent, playing up to market forces, social demands and vested interests. A thoroughly new policy is required which will be strictly enforced.

## 5.01 Educational Investments:

Karnataka was spending 2.6 per cent (2.5 all-India) of its SDP in 1960-61. It rose upto 3.66 per cent (3.2 all-India) in 1976-77 and remained steady thereafter. The per capita expenditure during the

Table 16

Engineering Admissions during the Academic Year 1984-85  
on Merit-cum-Reservation basis - Category-wise distribution

Category	SC	ST	BT	BCT	BCM	BSG	Gene- ral	Total
Percentage of Reservation	15	3	5	10	20	15	32	100%
No. Applied and their proportion-- to the total	967	129	437	489	1181	1800	3370	9003
(in per cent)	10.8	1.4	4.9	5.4	20.1	20	37.4	100.0
No. Admitted and their proportion-- to the total	820	129	275	489	1090	820	1814	5437
(in per cent)	15	2.4	5	9	20	15	33.6	100.0

### Notes:

Total No. of candidates applied - 9003.  
Total No. of candidates admitted on Merit-cum-Reservation  
basis - 5437 (46%).  
Total No. of candidates admitted on capitation fees basis -



6437 (54%).  
Grand total of the candidates admitted into Engineering course -  
11,873 during 1984-85.

Table 17

Engineering Admissions during the Academic Year 1985-86  
on Merit-cum-Reservation basis - category wise distribution

Category	SC	ST	BT	BCT	BCM	BSC	Gene- ral	Total
Percentage of Reservation	15	3	5	10	20	15	32	100%
No. Applied and their proportion-- to the total	1001	180	384	369	2049	2843	5685	12,511
(in per cent)	9	1.5	3.1	3.0	19	21.5	42.9	100.0
No. Admitted and their proportion-- to the total	810	160	270	369	1059	800	1900	5,368
(in per cent)	15	3	5	6.5	20	14.5	36	100.0

Notes:

Total No. of candidates applied - 12,511.  
Total No. of candidates admitted on Merit-cum-Reservation

basis - 5368 (45%).

Total No. of candidates admitted on capitation fee basis - 6785 (55%).

Grand total of the candidates admitted into Engineering course - 12,153 during 1985-86.

Table 18: Distribution of Seats - Engineering Admissions -  
for the academic year 1984-85 in Karnataka

TYPE OF THE INSTITUTION	INTAKE	MERIT CUM RESERVATION SYSTEM	UNDER CAPITATION FEE - SYSTEM
Government (5)	1050	1050	-
Aided (11)	3298	2106	1192
Private (34) (Un-aided)	7525	2281	5244
Total (50)	11,873	5437	6436

Table 19: Distribution of Seats - Engineering Admissions -  
for the Academic year 1985-86 in Karnataka

TYPE OF THE INSTITUTION	INTAKE	MERIT CUM RESERVATION SYSTEM	UNDER CAPITATION FEE - SYSTEM
Government (5)	1077	1077	-
Aided (11)	3312	1993	1319



Private (34) (Un-aided)	7764	2298	5466
Total (50)	12,153	5368	6785

Table 20: Medical Admissions during the academic year 1985-86 on Merit-cum-Reservation basis - category wise distribution in Karnataka

Category	SC	ST	BT	BCT	BCM	BSG	General	Total
Percentage of Reservation	15	3	5	10	20	15	32	100%
No. Admitted and their proportion to the total (in per cent)	120	25	39	79	160	121	319	863
	13	3	4.5	9	18	13	39	100

Notes:

Total No. of candidates admitted on Merit-cum-Reservation basis - 863 (48%).

Total No. of candidates admitted on capitation fees basis - 887 (52%).

Grand total of the candidates admitted into Medical Course - 1750 during 1985-86.

Table 21: Medical Admissions during the academic year 1986-87 on Merit-cum-Reservation basis - category wise distribution.

Category	SC	ST	BT	BCT	BCM	BSG	General	Total
Percentage of Reservation	15	3	5	10	20	15	32	100%
No. Admitted and their proportion to the total (in per cent)	132	26	44	88	174	130	338	932
	14	3	4.5	9	18	14	37.5	100.0

Notes:

Total No. of candidates admitted on Merit-cum-Reservation basis - 932 (47%)

Total No. of candidates admitted on Capitation fees basis - 1058 (53%).

Grand total of the candidates admitted into medical courses - 1990 during 1986-87.

Table 22: Distribution of Seats - Medical Admissions  
for the academic year 1985-86 in Karnataka

TYPE OF THE INSTITUTION	INTAKE	MERIT CUM RESERVATION SYSTEM	UNDER CAPITATION FEE SYSTEM
Government (4)	550	550	-
Private (12) (Un-aided)	1200	313	887
TOTAL (16)	1750	863	887

Table 23: Distribution of Seats - Medical Admissions  
for the academic year 1986-87 in Karnataka.

TYPE OF THE INSTITUTION	INTAKE	MERIT CUM RESERVATION SYSTEM	UNDER CAPITATION FEE-SYSTEM
Government (4)	550	550	-
Private (12) (un-aided)	1440	382	1058
TOTAL (16)	1990	932	1058

reference period went up from Rs.9/- (Rs.8.8) to Rs.35/- (Rs.35/- all-



India) on education in the state. Cost per pupil went up from Rs.46.7 (Rs.53.7 all-India) to Rs.187/- (Rs.211/-all-India). Budget expenditure as percentage of total (revenue) budget went up from 21.2 per cent (22.5%) in 1960-61 to 23.5 per cent (24.3%) in 1982-83.

In 1960-61, of the total educational expenditure in the state, 72 per cent came from government, 3 per cent from local bodies, 12 per cent from fees and 12 per cent from other sources. But in 1976-77 the picture was that government paid 79 per cent, local bodies, proportion negligible, fees hardly 6 per cent (enrolment went up and fees came down), and other sources 15 per cent.

The general picture is that of the total educational expenditure efforts in the states, only 9.3 per cent is paid by the Centre and 90.7 percent is paid by the state governments (1978-79) (Education is in the concurrent list - joint responsibility).

Of the total expenditure in the state (1975-76) the level-wise distribution is as follows in comparison to 4 educationally advanced states:

Table 24: Public Expenditure on Education in Selected States.  
(1975-76)

States/ Levels	Pri- mary %	Middle %	Ele- men- tary %	Secon- dary %	High- er %	Total Direct %	Total Indir- ect %	Total
Karnataka	13.9	27.1	41.0	14.8	30.2	86.2	13.8	100
Gujarat	8.6	33.0	41.6	23.7	20.5	85.5	14.5	100
Tamilnadu	26.0	15.8	42.4	27.2	21.5	90.9	9.1	100

Maharashtra	14.0	25.2	39.1	26.8	22.6	88.5	11.5	100
Kerala	21.3	20.1	41.5	32.4	18.0	91.7	8.3	100

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Incidentally Karnataka spends the highest proportion on higher education among all the states in India. Secondary education has been very much neglected.

Of the total costs on education, 94.8 per cent is of recurring type: salaries of teachers (71.6 per cent), salaries of non-teaching staff (9.5 per cent), totalling 81.1 per cent on salaries, and the rest on stipends, fee concessions (2.7%), maintenance of buildings, equipment and furniture, chemicals and apparatus, libraries, games and sports, hostels, etc.

Non-recurring cost is hardly 5.2 per cent of the total (1976-77 data) which is spent on buildings, libraries, equipment, furnitures, etc.

Social cost per pupil is very high for some courses like Public Health; Business Management; Veterinary Science; Agriculture and Forestry; Medicine; Physical Education; Engineering; Technology and Architecture, as compared to general education courses.

In the fifties and early sixties, non-plan expenditure and plan expenditure were in 60:40 ratio, now it is 86:14 (1980-81); 84:16 (1978-79). While non-plan expenditure has grown by 14.8 per cent, plan expenditure has grown only by 11.5 per cent over the years 1950-51 to 1980-81.

#### 6.01 Future Perspectives:



While it is undemocratic to impose a particular type of education on the people in a free state, still government will have every right to regulate its own expenditure on particular types of education. This expenditure should reflect the social philosophy of the state which is one of equality and justice.

It is unfair to collect taxes from 100 per cent of the people and spend 30 per cent of it on only 2 per cent of the population (higher education clientele) depriving the others of their legitimate rights; right to primary education of a given quality. The state government should concentrate on primary and secondary education (as per the directive principles of state policy, primary education is a state responsibility) and Centre should meet the entire cost of higher education (education is a concurrent subject: both power and financial responsibility should be shared protecting university autonomy and academic freedom at the same time). Even now, of the nearly 10 per cent expenditure that the centre is spending on higher education, 7 per cent is spent on central universities, IIT's and deemed universities. The rest of the 3 per cent will be spent on the universities and colleges in the country as developmental expenditure.

The per pupil expenditure on higher education is well over Rs.1432 in general, Rs.1094 on graduate and undergraduate levels while the overall expenditure in per pupil terms is Rs.187/-; per pupil expenditure on primary education is Rs.50/- only.

#### 6.02 Future Strategies:

Nationalisation of primary and secondary education in the state,



increasing responsibility for vocational education and polytechnic education, increasing privatisation of higher education with regulated admissions, differential pricing policies, protective discrimination in provision of subsidies, regulation of academic standards and quality etc.; should be the guiding principles in future developments of education in the state.

In particular, expansion of higher education needs to be regulated. Engineering, medical, para-medical, teacher-training, agricultural, veterinary and other professional types of education should be run on the basis of a supply-demand calculus. Admissions should be strictly guided by equity and merit consideration. Financial ability to pay for such an education irrespective of equity or merit or in other words, the capitation fee system should be abolished. General higher education should be partial to commerce courses in general and especially for women. General arts and science courses should be encouraged only through the open university system. The private cost of higher education in general should exceed the social cost.

Fee structure in higher education needs to be rationalised by making the poor and merited pay less for their education. 'Norms' should be established for opening and running colleges of professional and general education.



## REFERENCES

1. Education in Rural Areas: Constraints and Prospects (Study in Karnataka State), by A.S.Seetharamu and M.D.Ushadevi, Ashish, New Delhi, 1985.
2. Education in slums (Study in Bangalore City) by A.S.Seetharamu, Ashish, New Delhi, 1982.
3. "A Study of Utilisation of Educational Facilities by Scheduled Castes in Karnataka State" by D.Premala Bai, Ph.D. Thesis, University of Mysore, 1985.
4. "Education in the States", Annual reports published by the Ministry of Education, Government of India, 1956-57 to 1980-81.
5. "Estimate based on actual figures enrolment for the year 1984-85, Annual Report, Department of Public Instruction, Government of Karnataka.
6. Population projections for Karnataka: 1981 to 2001 by P.M.Kulkarni, ISEC, 1985 (Mimeo).
7. Fourth All India Educational Survey, NCERT, 1980, Table 113 pp.660-661.
8. National Policy on Education: Programme of Action, Ministry of HRD, GOI, 1986, p.17.
9. "Non-formal education for children in 9-14 age group in Karnataka State" by S.N.Sakuntala, Ph.D. thesis submitted to the University of Mysore, 1987.
10. "Performance of the Secondary School System in Karnataka State" by H.S. Ganesha Bhatta on-going Ph.D. research.
11. Vocational Education: Problems and Prospects by G.Thimmaiah and others, Himalaya, Bombay, 1982.
12. "Returns from Women's Education" (A case study in Bangalore City) by N.Shantha, Ph.D. Thesis, University of Mysore, 1982.
13. "Basic Statistics" published by NIEPA, 1985.
14. "33rd report of the UPSC", April 1, 1982 to March 31, 1983.
15. "Rural In-Migrants in Higher Education" by A.S.Seetharamu, CISRS, Madras, 1982.
16. "Social class, Educational Achievement and Educational Opportunity: A Study of Engineering and Medical Admissions in Karnataka State". On-going Ph.D. study by Gourishankar, ISEC, Ph.D. Fellow.



# ಕರ್ನಾಟಕ ನರ್ಕಾರ ಸಚಿವಾಲಯ

ಆವೃತ್ತಿ ಪ್ರವೃತ್ತಿ/ಸಂಖ್ಯೆ

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